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TRANSCRIPT OF RECORD

Government Exhibits

VOLUME X

IN THE

DISTRICT COURT OF THE UNITED STATES

For the District of New Jersey

United States of America

vs.

United States Steel Corporation and others

2780
S85
U5
v.40

A.297851

UNITED STATES

vs.

UNITED STATES STEEL CORPORATION.

GOVERNMENT EXHIBITS VOL. X.

Government Exhibit	*Subject.*	*Page.*
No. 411	Telegram of February 28, 1901 from Nelson P. Hulst, Milwaukee, to James Gayley, New York; telegram from James Gayley to Nelson P. Hulst, February 28, 1901; and telegram of February 6, 1901 from James Gayley, Pittsburgh, to Dr. Nelson P. Hulst, Milwaukee.....	2411
No. 412	Five tables entitled "Estimate of Iron Ore Reserves in the Lake Superior Region as of Jan. 1, 1906"	2412
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No. 414	(For identification.) This exhibit was marked for identification only, and read in evidence. (See page 3738 of Printed Volume IX of the Testimony)	2419
No. 415	Extracts from book entitled "Appraisal of Mining Properties of Michigan by the State Board of Tax Commissioners, 1911"...........................	2419
No. 416	Agreement dated November 1, 1905 between Carnegie Steel Company and Standard Steel Car Company.........	2487
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No. 418	Agreement dated June 30, 1909 between Carnegie Steel Company and Oliver Iron & Steel Company................	2500
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No. 420	Contract dated November 15, 1904 between Carnegie Steel Company and American Locomotive Company covering steel billets, etc.	2511
No. 421	Letter of December 30, 1904 from American Bridge Company to W. V. S. Thorne, director of purchases, covering material for railway steel structures for Union Pacific Railroad Co., etc....	2513
No. 422	Letter of July 28, 1908 from American Bridge Company to W. V. S. Thorne; letter of July 30, 1908 from W. V. S. Thorne to American Bridge Company, and letter of July 31, 1908 from W.V. S. Thorne to American Bridge Company regarding steel structure material for Union Pacific R. R. Co., etc...........	2519

Government Exhibit Kerr, No. 411.

(March 18, 1913.)

TELEGRAM.

MILWAUKEE, WIS. Feb. 28th, 1901.

JAMES GAYLEY,
Holland House, New York City.

My estimate of fee tonnage is thirty-one and one quarter millions. My estimate of leased tonnage forty-eight and a quarter millions. These figures include Biwabic, Mountain Iron, Lone Jack, Missabe Mountain and Ohio mines. Sellwood's estimate as first given to me was lump value of about seven million dollars, which did not include Mountain Iron, Ohio, Aetna, Snively and Minnewas. I was told that Sellwood's estimate submitted later than mine was practically the same as mine. I do not know how he divided up the tonnage as to lease or fee, or whether he gave lump values for mines as was his method in first statement shown to me.

NELSON P. HULST.

TELEGRAM.

Rush Delivery tonight
NEW YORK, February 28, 1901.

NELSON P. HULST,
Milwaukee, Wisconsin.

What was your estimate of fee and leased tonnage of Consolidate properties as estimated by you and Sellwood. Wire promptly Holland House.

JAMES GAYLEY.

7:27 P.M.,

TELEGRAM.

PITTSBURGH, PA. Feb. 6, 1901.

DR. NELSON P. HULST,
New Ins. Building,
Milwaukee.

Please proceed at once to New York tonight and report to Mr. Schwab at Holland House. Better take estimates of ore reserves with you.

JAMES GAYLEY.

Government Exhibit No. 412
Sheet 1
March 19, 1913

ESTIMATE OF IRON ORE RESERVES IN THE LAKE SUPERIOR REGION

AS AT JANUARY 1st, 1906

ALL RANGES

	BESSEMER Tons	NON-BESSEMER Tons	SILICIOUS Tons	TOTAL Tons
United States Steel Corp	480 060 000	339 442 000	64 814 500	884 316 500
The Hill Interests	57 000 000	40 000 000	....	97 000 000
Northern Pacific R'y	16 000 000	18 000 000	....	34 000 000
Total	553 060 000	397 442 000	64 814 500	1 015 316 500
Republic I. & Steel Co	4 000 000	5 700 000	3 000 000	12 700 000
Jones & Laughlins	9 600 000	14 500 000	1 200 000	25 300 000
Lackawanna	7 800 000	3 200 000	....	11 000 000
Cambria	33 300 000	18 200 000	500 000	52 000 000
International Harvester Co	11 300 000	4 700 000	....	16 000 000
LaBelle Iron Works	200 000	7 400 000	....	7 600 000
Total, Steel Companies	66 200 000	53 700 000	4 700 000	124 600 000
Rogers, Brown & Co	2 500 000	8 200 000	1 000 000	11 700 000
Shenango Furnace Co	9 700 000	12 800 000	2 000 000	24 500 000
Cherry Valley Iron Co	3 400 000	2 700 000	....	6 100 000
Pickands, Mather & Co	8 800 000	17 300 000	2 000 000	28 100 000
Northwestern Iron Co. (Iron Ridge)	....	2 000 000	....	2 000 000
Corrigan, McKinney & Company	18 350 000	13 650 000	2 500 000	34 500 000
Cleveland Cliffs Iron Co	7 100 000	22 050 000	10 500 000	39 650 000
M. A. Hanna & Co	50 000	4 150 000	750 000	4 950 000
Tod, Stambaugh & Co	3 000 000	6 000 000	....	9 000 000
Joseph Sellwood	3 500 000	....	....	3 500 000
Parties connected with Hill interests	....	13 600 000	....	13 600 000
40 Props. Controlled by Minn. people	24 000 000	23 000 000	....	47 000 000
Oglebay, Norton & Co	1 025 000	1 500 000	....	2 525 000
Breitung Interests	50 000	5 000 000	....	5 050 000
Volunteer Iron Company	....	1 550 000	....	1 550 000
Van Dyke, et al	48 000	389 000	1 037 000	1 474 000
Florence Iron Company	....	800 000	....	800 000
Victor Schlitz Mining Company	....	250 000	....	250 000
Newport Mining Co	2 500 000	1 000 000	....	3 500 000
Dunn Mining Company	60 000	50 000	....	110 000
Wisconsin Mining Company	50 000	50 000	....	100 000
Harmony Iron Company	....	25 000	....	25 000
Ashland Iron Company	200 000	100 000	....	300 000
TOTALS	703 593 000	587 306 000	89 301 500	1 380 200 500

Government Exhibit No. 412
Sheet 2
March 19, 1913

ESTIMATE OF IRON ORE RESERVES ON THE LAKE SUPERIOR IRON ORE RANGES

AS OF JANUARY 1, 1906

MESABA RANGE

	BESSEMER Tons	NON-BESSEMER Tons	TOTAL Tons
United States Steel Corporation	430 000 000	304 000 000	734 000 000
The Hill Interests	57 000 000	40 000 000	97 000 000
Northern Pacific R. R.	16 000 000	18 000 000	34 000 000
Total	503 000 000	362 000 000	865 000 000
STEEL & FURNACE COMPANIES:			
Republic Iron & Steel	3 800 000	5 000 000	8 800 000
Jones & Laughlin	9 300 000	13 300 000	22 600 000
Lackawanna	5 800 000	3 200 000	9 000 000
Cambria	32 000 000	16 000 000	48 000 000
International Harvester	10 300 000	3 700 000	14 000 000
LaBelle	200 000	7 400 000	7 600 000
Total, Steel Companies	61 400 000	48 600 000	110 000 000
Rogers, Brown & Co	2 500 000	8 200 000	10 700 000
Shenango Furnace Co	9 700 000	12 800 000	22 500 000
Cherry Valley & Co	3 400 000	2 700 000	6 100 000
Total, Steel & Furnace Cos.	77 000 000	72 300 000	149 300 000
ORE MINING COMPANIES:			
Pickands Mather & Co	8 800 000	13 400 000	22 200 000
Corrigan, McKinney & Co	16 500 000	11 000 000	27 500 000
Cleveland Cliffs Co	2 200 000	....	2 200 000
M. A. Hanna & Co	....	4 000 000	4 000 000
Tod, Stambaugh & Co	3 000 000	6 000 000	9 000 000
Joseph Sellwood	3 500 000	....	3 500 000
Parties connected with Hill Interests	....	13 600 000	13 600 000
Forty properties controlled principally by Minnesota people	24 000 000	23 000 000	47 000 000
Total, Ore Mining Cos	58 000 000	71 000 000	129 000 000
GRAND TOTAL	638 000 000	505 300 000	1 143 300 000

Government Exhibit No. 412
Sheet 3
March 19, 1913

MENOMINEE, BARABOO AND IRON RIDGE RANGES

	BESSEMER Tons	NON-BESSEMER Tons	TOTAL Tons	SILICIOUS Tons	TOTAL ALL GRADES Tons
STEEL & FURNACE COMPANIES:					
United States Steel Corp.	10 700 000	2 300 000	13 000 000	4 700 000	17 700 000
United States Steel Corp. High Phos. Iron Ridge	....	20 000 000	20 000 000	....	20 000 000
Republic Iron & Steel	....	....	....	2 000 000	2 000 000
Cambria	300 000	1 700 000	2 000 000	500 000	2 500 000
International Harvester Co	1 000 000	1 000 000	2 000 000	....	2 200 000
Rogers, Brown & Co	....	....	....	1 000 000	1 000 000
Shenango Furnace Co	....	....	....	2 000 000	2 000 000
Total, Steel & Fce. Cos	12 000 000	25 000 000	37 000 000	10 200 000	47 200 000
ORE MINING COMPANIES:					
Pickands, Mather & Co	....	1 400 000	1 400 000	2 000 000	3 400 000
Northwestern Iron Co. (I.R.)	....	2 000 000	2 000 000	....	2 000 000
Corrigan, McKinney & Co	....	1 850 000	1 850 000	....	1 850 000
M. A. Hanna & Co	50 000	150 000	200 000	....	200 000
Oglebay, Norton & Co	....	600 000	600 000	....	600 000
Van Dyke & Others	48 000	389 000	437 000	1 037 000	1 474 000
Florence Iron Co	....	800 000	800 000	....	800 000
Victor Schlitz Mining Co	....	250 000	250 000	....	250 000
Total, Ore Mining Cos	98 000	7 439 000	7 537 000	3 037 000	10 574 000
GRAND TOTAL Men., Baraboo & I.R. Ranges	12 098 000	32 439 000	44 537 000	13 237 000	57 774 000

Government Exhibit No. 412
Sheet 4
March 19, 1913

MARQUETTE RANGE

	BESSEMER Tons	NON-BESSEMER Tons	TOTAL Tons	SILICIOUS Tons	TOTAL ALL GRADES Tons
STEEL & FURNACE COMPANIES:					
United States Steel Corp..........	3 660 000	8 915 000	12 575 000	58 114 500	70 689 500
Republic Iron & Steel.............	200 000	700 000	900 000	1 000 000	1 900 000
Jones & Laughlin..................	250 000	1 200 000	1 450 000	1 200 000	2 650 000
Cambria...........................	1 000 000	500 000	1 500 000	....	1 500 000
Total, Steel & Furnace Cos....	5 110 000	11 315 000	16 425 000	60 314 500	76 739 500
ORE MINING COMPANIES:					
Corrigan, McKinney & Co...........	....	....	....	2 500 000	2 500 000
Cleveland Cliffs Iron Co..........	3 700 000	21 250 000	24 950 000	10 500 000	35 450 000
M. A. Hanna & Co..................	....	....	....	750 000	750 000
Oglebay, Norton & Co..............	....	500 000	500 000	....	500 000
Breitung Interests................	50 000	5 000 000	5 050 000	....	5 050 000
Volunteer Iron Co.................	....	1 550 000	1 550 000	....	1 550 000
Total, Ore Mining Cos.........	3 750 000	28 300 000	32 050 000	13 750 000	45 800 000
GRAND TOTAL, Marquette Range.......	8 860 000	39 615 000	48 475 000	74 064 000	122 539 500

Government Exhibit No. 412
Sheet 5
March 19, 1913

GOGEBIC RANGE

	BESSEMER	NON-BESSEMER	TOTAL
STEEL & FURNACE COMPANIES:			
United States Steel Corp.	16 700 000	2 800 000	19 500 000
Jones & Laughlin	50 000	....	50 000
Lackawanna	2 000 000	....	2 000 000
Ashland Iron Co	200 000	100 000	300 000
Total, Steel & Furnace Cos	18 950 000	2 900 000	21 850 000
ORE MINING COMPANIES:			
Pickands, Mather & Co	....	2 500 000	2 500 000
Corrigan, McKinney & Co	1 850 000	800 000	2 650 000
Cleveland Cliffs Iron Co	1 200 000	800 000	2 000 000
Oglebay, Norton & Co	1 025 000	400 000	1 425 000
Newport Mining Co	2 500 000	1 000 000	3 500 000
Dunn Mining Co	60 000	50 000	110 000
Wisconsin Mining Co	50 000	50 000	100 000
Harmony Iron Co	....	25 000	25 000
Total, Ore Mining Cos	6 685 000	5 625 000	12 310 000
GRAND TOTAL, Gogebic Range	25 635 000	8 525 000	34 160 000

VERMILLION RANGE

	BESSEMER Tons	NON-BESSEMER Tons	TOTAL Tons	SILICIOUS Tons	TOTAL ALL GRADES Tons
United States Steel Corp.	19 000 000	1 427 000	20 247 000	2 000 000	22 427 000

Government Exhibit No. 413
March 18, 1913

SUMMARIES OF ORE RESERVES -- JANUARY 1, 1908

(Exclusive of Hill ores)

LAKE SUPERIOR RANGES

	STANDARD ORES							S		
	TONS DEVELOPED		TONS PROBABLE ADDITIONAL		TOTAL TONS DEVELOPED AND PROBABLE ADDITIONAL			TONS DEVELOPED		T PROBABLE
	Bessr.	Non-Bessr.	Bessr.	Non-Bessr.	Bessr.	Non-Bessr.	Bessr. & Non-Bessr.	Bessr.	Non-Bessr.	Bessr.
Gogebic.........	4,943,600	1,229,500	11,764,700	5,231,500	16,708,300	6,461,000	23,169,300		184,700	
Marquette.......	33,750	3,861,800		10,653,000	33,750	14,514,800	14,548,550		3,443,250	
Menominee.......	5,000	5,407,963		4,275,447	5,000	9,683,410	9,688,410	2,172,500	2,435,804	1,000,000
Vermillion......	5,630,089	562,415	3,514,944	1,270,000	9,145,033	1,832,415	10,977,448			
Iron Ridge......				20,000,000		20,000,000	20,000,000			
Baraboo.........		1,319,916				1,319,916	1,319,916		8,373.154	
Missabe.........	307,958,306	481,789,136	30,200,000	124,300,000	338,158,306	606,089,136	944,247,442			
Washable.....								34,541,141	38,725,045	3,000,000
Non-Wash.....								7,598,484	109,641.932	
Totals.........	318,570,745	494,170,730	45,479,644	165,729,947	364,050,389	659,900,677	1,023,951,066	44,312,125	162,803,885	4,000,000

Government Exhibit No. 413
March 18, 1913

SUMMARIES OF ORE RESERVES -- JANUARY 1, 1908

(Exclusive of Hill ores)

LAKE SUPERIOR RANGES

STANDARD ORES							SILICIOUS ORES						
TONS DEVELOPED		TONS PROBABLE ADDITIONAL		TOTAL TONS DEVELOPED AND PROBABLE ADDITIONAL			TONS DEVELOPED		TONS PROBABLE ADDITIONAL		TOTAL TONS DEVELOPED AND PROBABLE ADDITIONAL		
essr.	Non-Bessr.	Bessr.	Non-Bessr.	Bessr.	Non-Bessr.	Bessr. & Non-Bessr.	Bessr.	Non-Bessr.	Bessr.	Non-Bessr.	Bessr.	Non-Bessr.	Bessr. & Non-Bessr.
943,600	1,229,500	11,764,700	5,231,500	16,708,300	6,461,000	23,169,300		184,700		815,300		1,000,000	1,000,000
33,750	3,861,800		10,653,000	33,750	14,514,800	14,548,550		3,443,250		57,065,250		60,508,500	60,508,500
5,000	5,407,963		4,275,447	5,000	9,683,410	9,688,410	2,172,500	2,435,804	1,000,000	2,240,196	3,172,500	4,676,000	7,848,500
630,089	562,415	3,514,944	1,270,000	9,145,033	1,832,415	10,977,448				2,000,000		2,000,000	2,000,000
			20,000,000		20,000,000	20,000,000							
	1,319,916				1,319,916	1,319,916		8,373.154				8,373,154	8,373,154
958,306	481,789,136	30,200,000	124,300,000	338,158,306	606,089,136	944,247,442							
							34,541,141	38,725,045	3,000,000	11,000,000	37,541,141	49,725,045	87,266,186
							7,598,484	109,641.932		8,500,000	7,598,484	118,141,932	125,740,416
570,745	494,170,730	45,479,644	165,729,947	364,050,389	659,900,677	1,023,951,066	44,312,125	162,803,885	4,000,000	81,620,746	48,312,125	244,424,631	292,736,756

Government Exhibit No. 414.

(for identification).

Telegram, signed D. G. Kerr, sent to Mr. W. J. Olcott, was marked for identification only, and read in evidence. (See Page 3738 of printed Volume IX of the testimony.)

Government Exhibit No. 415.

March 19, 1913

(Consisting of extracts from volume entitled:)

APPRAISAL
of
MINING PROPERTIES
of
MICHIGAN
by the
STATE BOARD OF TAX COMMISSIONERS.
(Seal of the
State of Michigan)
Under provisions of Act No. 114, of the Public Acts of 1911.

LANSING, MICHIGAN
WYNKOOP HALLENBECK CRAWFORD CO., STATE PRINTERS
1911.

LETTER OF TRANSMITTAL.

LANSING, MICHIGAN, August 21, 1911

STATE BOARD OF EQUALIZATION, LANSING, MICHIGAN:

GENTLEMEN:—

Pursuant to the provisions of Act No. 114, of the Public Acts of 1911, approved April 25, 1911, an appraisal and inventory of the mining properties of the State has been mad under our direction, and we submit herewith the printed report of Mr. James R. Finlay, mining engineer of New York under whose personal direction and supervision the work ha been done.

The extent and magnitude of the work imposed under th provisions of the statute made the employment of an expert of recognized standing and ability an absolute necessity Fitness for the work was the only qualification sought or required by the Board, and the only endorsements or recommendations given consideration were those coming from mining experts and educators having special and technical knowledge of the work to be performed.

After a thorough investigation and the most careful consideration of all those whose names had been suggested, Mr. Finlay was selected, and as soon as the preliminary details could be arranged, he entered upon the discharge of his duties. The selection of all the expert assistants was placed with Mr. Finlay and he was given full and complete authority regarding every detail of the work. Headquarters were established in the mining district and an efficient and well-equipped force was organized for the office duties. The appraiser and those working under him were given full and complete authority to call for and demand any and all information obtainable from the books, records, maps, etc., of the mining companies. In every instance access to all these sources of information was promptly and cheerfully given.

Appraiser Finlay gives in detail the result of the work done by himself and under his direction, and fully sets forth the methods adopted in arriving at the results.

Very respectfully,
James H. Thompson,
Robert H. Shields,
George B. Horton,
Board of State Tax Commissioners.

New York City, August 18, 1911.

Board of State Tax Commissioners of Michigan, Lansing, Michigan:

Gentlemen:—I respectfully submit herewith my report on the Appraisal of the various Mines of Michigan, with comments on certain properties which, at the beginning of the investigation, it was thought might be classed as mines, but which, at the end, I believed should be classed as manufacturing concerns.

I transmit herewith the following documents, which are the basis of my report, and should be considered a part of it:

1. 83 Copper Mine Reports and a card index, giving a list of all Copper Companies, and a guide to report numbers, as well as a record of correspondence on Copper.

   On these reports a memorandum of valuation is entered in red pencil, except in the case of the Quincy Mine, which made no report, all data on this concern being secured by personal examination.

   A Book of Charts of 5-Year Summaries of Michigan Copper Mines, taken from published annual reports.

   A Chart showing the record of money spent in the past five years by Copper Companies reporting, and their receipts from sale of Copper.

   Original Pencil Copy Maps and Tracings, showing ownerships along the Copper Belt. Numbers enclosed in circle on plats are used instead of the name of owners. For example: No. 36 indicates land owned by St. Mary's Mineral Land Company. On each plat the name of the owner will occur once, with the reference number.
2. 51 Reports of Iron Mining Companies, covering more than 100 mines, on which a red pencil memorandum showing the valuation of each will be found, also a Card Index.

   The alphabetical list on this Card Index refers to the card number of the mines. On this card will be

found records of shipments and numbers referring to the companies' reports.
Book of Blue Prints, showing ownerships of Iron Lands and location of ore bodies, by C. K. Leith.
2 Lists of Ownerships of Iron Lands and descriptions of lands, by C. K. Leith.

3. Reports of Coal Companies.
4. 28 Reports by Salt, Cement, Gypsum, and Miscellaneous Companies.
   13 Plats of Salt Land Ownerships, covering 29 properties, with reports by C. W. Cook.
   3 Plats covering 9 Gypsum Ownerships, and reports by Horace F. Lunt.
   24 Plats of Cement Ownerships, covering 22 properties, and reports by C. W. Cook.
   8 Plats showing location of Limestone Quarries and Ownerships, and comments by C. W. Cook.
5. 5 Files of Correspondence with various Companies and with my Assistants.
6. Complete Reports on Coal Lands and a report showing digest of information on Cement and Miscellaneous Properties, by H. M. Chance.

Dr. Leith's report on Iron Ore and Mr. Hagues's report on the Copper ores were both made in collaboration with myself, and the results are embodied in my own report.

Yours very truly,

J. R. Finlay.

Appraisal of the Mines of Michigan.

INTRODUCTION.

This work was undertaken under extraordinary conditions: I was notified on May 24th, 1911, that I had been selected by your Board with the approval of the Governor and the Board of State Auditors, to appraise all the Mines of Michigan, including the Copper, Iron, Coal, Salt, Gypsum, and Miscellaneous, and hand in a report on their valuation before August 21st.

In some preliminary discussions I had become aware that it was considered necessary to have the work done under the general charge of an outside Mining Engineer, but it was not until I had arrived in Michigan that I became aware that Assistant Engineers, who were to look up the details in regard to mining properties, should also be outside men. It was not for some days that I fully realized that both the state of public opinion on matters of taxation and certain local feelings of rivalry and antagonism made it highly desirable that the whole work should be done by independent men from outside of Michigan. It goes without saying that this requirement added something to the difficulty of procuring precise information with the celerity that the shortness of the time seemed to demand.

It also made it plain from the very beginning that no examination of Mines in the ordinary sense could be attempted. Such an examination usually means a verification of the quality and quantity of ore remaining in the mines. To do this was plainly a physical impossibility.

The work therefore resolved itself into an examination of the essential records of the various mines. This not only seemed possible in the beginning, but proved to be possible, and I am able to submit a report on nearly all the mines, with full confidence that it is correct, barring minor inaccuracies due to hurry.

This would not have been possible except for the thorough-going co-operation of the mining companies themselves. Practically all of the concerns in Michigan which admitted themselves to be mining companies, showed a willingness to take great pains to furnish information fully and exactly, and to facilitate examination of maps and underground workings.

I was fortunate in being able to secure the services of the following gentlemen for various departments of the work:

Prof. C. K. Leith, of the University of Wisconsin, and formerly of the United States Geological Survey, for the Iron Mines. Dr. Leith has had broad experience with iron ores and their geology, not only in the entire Lake Superior region, but in various other parts of the world, and is a recognized authority on the subject.

Mr. William Hague, of New York, for the Copper Mines. Mr. Hague is Managing Director of the North Star Mining Company of California, is a thoroughly well trained Mining Engineer, and has had considerable experience in copper mining in the southwest. He was also equipped with a general acquaintance with the Lake Superior Copper Mines.

Dr. H. M. Chance, of Philadelphia, was employed to examine the Coal Mines, and also to study the question of what other mineral using concerns of the Lower Peninsula might properly be called mines. Dr. Chance was organizer of the Mining and Metallurgical Society of America, was formerly a Member of the Geological Survey of Pennsylvania, and has had a wide and thorough experience in Coal mining and allied industries.

Mr. Horace F. Lunt and Prof. C. W. Cook, of Ann Arbor, were employed to secure information about Coal, Gypsum, Salt, Cement, and Limestone properties in the Lower Peninsula.

Mr. Lunt is a Mining Engineer of Colorado Springs, Colorado, and Prof. Cook has made a specialty of the study of the salt industry of Michigan.

Mr. Heath Steele, formerly of Goldfield, Nevada, had charge of the correspondence and statistical work of the Houghton office.

Other employes in the capacity of Stenographers, Officemen and Assistants were Messrs. Schantz, Carson, Nellist, Paine, Pearsall, Grant and Culvertson.

All of these gentlemen exerted themselves to the utmost to secure the results required within the time limit and within the appropriation, and to them and to the Mining Companies themselves is due the principal part of the credit for making the work as satisfactory as it is.

It was plain from the outset that at least eighty-five per cent (85%), (and it was later proved to be more than ninety-five per cent (95%) of the industries that could properly be called mining, belonged in the Upper Peninsula, and on this account the principal office was established in Houghton.

From this office circulars were sent out to all the Mining Companies, requiring certain information. One of these circulars is reproduced in the discussion of the Copper Mines, and it will serve as a model for the others. The information asked for from all kinds of properties was substantially the same.

At an early stage of the work it became plain that most of the companies producing Salt, Gypsum, Cement, Limestone, Brick-clay, etc., did not consider themselves to be mining companies at all, and answered the circulars with reluctance. So many of them brought forward this contention that considerable attention was given to the subject, with the final result that all of my assistants in the Lower Peninsula, as well as myself, became convinced that they were right, and that these concerns were not, strictly speaking, mining companies, but merely manufacturers that use minerals incidentally. This matter is discussed fully by Dr. Chance in a report which is appended.

All of the gentlemen employed by me as assistants made voluminous reports, which I quote liberally throughout my report. None of these, however, can suitably be reproduced in full. Dr. Leith's report is largely a review of facts concerning the Iron Mines, hastily compiled and submitted without editing. His determinations of tonnages were necessarily based on certain conventional assumptions. For instance, the only additions he made to the tonnage reported in sight by Iron Mines was equal to one working level for such mines as showed no marked evidence of weakening. Dr. Leith does not regard such additions to be sufficient for the purpose of gauging the full future value of the properties, and merely used it for the purpose of showing an amount of ore that would not meet dispute anywhere. The substantial additions to tonnage I have made myself.

I quote Dr. Chance's report on the Coal fields in full, so far as it relates to general conditions.

RESULTS IN SUMMARY.

VALUATION BY COUNTIES.

County.	*Copper.*
Keweenaw	$12,200,000
Houghton	57,315,000

Ontonagon	300,000
Total Copper	$69,815,000

Iron.

Gogebic District	No. 1	$41,560,000	$41,560,000
Iron "	No. 2	17,042,000	23,339,000
"	No. 3	6,297,000	
Dickinson District	No. 4	11,391,000	11,508,000
"	No. 9	117,000	
Baraga District	No. 5	335,000	335,000
Marquette District	No. 6	12,132,000	
"	No. 7	27,825,000	
"	No. 8	2,530,000	
"	No. 9	256,000	42,743,000
Total iron			$119,485,000

Coal.

Bay	$484,709
Saginaw	350,924
Midland	12,862
Tuscola	3,500
Shiawassee	9,750
Total coal	$861,745
Grand total	$190,161,745

These valuations are based substantially on past and present earnings. During the past five years profitable copper mines earned $50,937,690.27 over expenditures, but I consider these earnings abnormal, being mainly due to the great boom of 1906 and 1907. In 1906 these mines earned $21,093,000, but in 1910 only $7,075,000.

The iron mines earned in five years $57,551,202.06 without the benefit of any abnormal prices. In 1910, the earnings were higher than for the average.

The total valuation of the iron mines is $119,485,000 based on an expected annual tonnage for all the districts of 10,922,000 tons and a total estimate of ore reserve of $195,041,809 tons.

I feel justified in believing that while these tonnages are all that can be apportioned among the various properties with any degree of certainty, that the various districts can be counted on to produce ore somewhat as follows:

Marquette Range	150,000,000 tons
Menominee Range	150,000,000 tons
Gogebic Range	60,000,000 tons
Total	360,000,000 tons

The reasons for these expectations are given to some extent in the comments on the various districts.

This is probably the first time any considerable valuation of Michigan iron mines has been made public. It will probably excite interest and the question will be asked: How nearly correct is it? My answer is that any man who concedes that it is logical to found expectations of the future on the results of the past will be forced to admit that these valuations are correct within a very moderate range of error. It is to be remembered that the factors of cost and price are established by official and authentic documents, and that the life of the mines is also mainly established by the same kind of documents. The whole range of error lies in the mere extension of life that I have adopted as reasonable beyond what is plainly measurable. Now since the question is one of present values, it is demonstrable that my error in these extensions must be simply enormous before the error in valuation becomes considerable. The life of the mines is admitted to average sixteen years. If I extend this life to twenty years, the increase of life is 25%, but the increase of present value is only 15%.

THEORY OF APPRAISAL.

This report is a calculation of the value of mines to the permanent owner for the production of minerals. It is based on three factors: 1st average cost, 2nd average prices and 3rd an estimate of future life. The first two factors are determined by experience. The third factor, the life of the mine, is based partly on developed ore and partly upon an as sumption of continuance of known ore bodies beyond the present bottom levels of the mines. The assumption of continuance is based mainly upon the extent to which the continuity of the deposits has been proven for the district and for the type to which the mine belongs. It will be seen that these factors are quite as definite as those upon which calculations in the world of business are generally founded.

The future value of a series of dividends is reduced to a present value by the annuity method; that is, a sum is calculated upon which the series of dividends will pay five per cent interest and also provide each year a sinking fund instalment which, invested each year at 4% interest, and added to prior instalments similarly invested and reinvested, will equal the sum taken. This sum is the amount which an investor can afford to pay for the property.

TABLE OF PRESENT VALUES FOR A SERIES OF DIVIDENDS.

The following is a simplified table showing the present value on the above basis of a series of dividends for different periods.

A single dividend of $1.00 payable at the end of a year is worth	$0 95
A dividend of $1.00 continuing two years	1 85
" " " " " three years	2 70
" " " " " four years	3 50
" " " " " five years	4 26
" " " " " ten years	7 50
" " " " " fifteen years	10 00
" " " " " twenty years	11 96
" " " " " twenty-five years	13 51
" " " " " thirty years	14 74
" " " " " thirty-five years	15 73

UNPROFITABLE MINES HAVE NO VALUE.

The reasoning from these factors is pursued to its consequences. No definite value can be placed on any property for which any of the factors cannot be determined. Whenever the working of a mine proves that expenditures will equal or exceed receipts from products at average prices, the property has no value at all and it is appraised at zero.

STOCK MARKET VALUATIONS NOT CONSIDERED.

It will be observed that this method makes no mention of quoted values. It may be asked, and is asked, why it is that if the products of mines are valued by the process of purchase and sale, the mines themselves should not be so valued? If the price of wheat, copper and iron is fixed by the sales on an exchange, why not mining stocks? My answer is that wheat is good to eat. Like copper and iron it is a staple and necessary article, tangible and definite. The value of these commodities is universally recognized, whether they are quoted on exchange or not, and prices fluctuate only with the varying pressure of demand. Mining stocks do not represent anything definite. Some pay dividends, in which case their quotations are comparable with those of other securities, but in the majority of cases mining stocks represent nothing more tangible than hopes. They fluctuate wildly as these hopes rise and subside. The very fluctuations make these stocks useful for gambling. People buy them not as serious investments, but as temporary speculations; often knowingly paying far more than they are worth, on the chance of selling them to somebody else for still more. In many cases this sort of thing has been organized into a business which depends not on any intrinsic value in the properties but wholly upon gambling. For this purpose the stocks are prized not because they are stable but because they are unstable. A notable instance of this is that of the famous Comstock mines of Nevada, which have scarcely paid a dividend in thirty years. On the contrary the assessments have reached astounding figures, probably over a score of millions. The assessments paid by stockholders merely take the place of prizes paid by lotteries, serving no purpose except to perpetuate the gamble. The public, of course, is fed with tales of the marvelous possibilities of these great mines and their past record is pointed to often enough. Still it is doubtful if much of these stocks is sold to a gullible public. They are mainly bought and sold by seasoned gamblers with whom it is a case of "dog eat dog." While this is an extreme case, it is wholly true that gambling forms an element to be reckoned with in every district where trading in mining stocks has become established. The copper district of Michigan is no exception. There are in it cases of terrific fluctuations in stock values. The Arcadian mine was valued at one time at $12,000,000; a few years later at $60,000, by stock quotations.

These reasons make it evident that the use of stock quotations in a serious appraisal of mining properties is illogical and beneath the dignity of a sovereign state. But, if the method is illogical it is certainly impracticable because in Michigan the ownership of mines by stock companies, whose shares are traded in, is confined to a single district—the copper mines.

The much more important iron mines are owned mainly by outside corporations or partnerships simply as so much private property. No available quotations apply to them even remotely. It is obviously necessary to use a method that will apply fairly to all properties throughout the state.

VALUATION OF MINERAL LANDS ON WHICH WORKABLE DEPOSITS ARE NOT DEVELOPED.

It is plain that where no deposits have been worked and not even proved to exist, the definite factors which can be applied to the valuation of an active mine are lacking. In this case no definite appraisal can be made. A figure only represents a guess. I can see no way to come to any conclusion about such lands, other than to attempt such an analysis of the facts as may limit the range between which guesses will be reasonable. In this connection it seems desirable to discuss one or two points of difference between mining and other forms of business.

The mining business may properly be distinguished on the ground that an essential preliminary is the discovery of a deposit in the crust of the earth, that is inherently valuable. A sufficient quantity of rich gold ore in the remotest desert is valuable as soon as it is discovered. The *discovery* is valuable. The commercial problem of utilizing the ore can so certainly be solved that no one is much concerned about it. Such a deposit can only be valuable because it is limited in extent, consequently its size and the time it will last are points of great concern and a most essential factor in the value that can be put upon it. With minerals less valuable and more common—less valuable *because* they are more common—the commercial circumstances of a discovery play relatively a more important part. A copper mine in the interior of Alaska is not valuable unless it is large enough and rich enough to pay for a railroad to reach it. An iron mine in the middle of the Sahara would have no value at all even if a railroad ran across it. In other words an iron discovery to be valuable must be within the range of certain commercial conditions. The value of coal is still more a question of mere environment. It is so abundant and can be mined at so many places that the question of an assured market is far more vital to commercial success than the discovery of a seam of coal. When we come to still more common minerals, such as limestone, salt, gypsum and brick-clay we find that they are so enormously abundant that the discovery of them excites no comment whatever. It is doubtful whether the discovery of salt, for instance, is of any value. The ocean is full of salt. Deposits are known in Michigan which would apparently supply the whole world for thousands of years. The utilization of such minerals, therefore, is wholly a commercial question, and I am disposed to draw a line between mines and other industries on the simple ground of whether the mineral rights on which they are based have value or not.

Many industries, which no one thinks of calling mines, use minerals and even mining processes. The Pennsylvania Railroad has for years been conducting the mining operations of shaft sinking and tunneling for the purpose of developing its terminals in New York City, but nobody calls the railroad a mine or New York a mining camp. Similarly we do not find a sufficient reason for calling the brick maker and the cement manufacturer miners because the first digs clay and the second dredges marl. If, however, brick clay were a limited product valuable enough to make the mere hope of its discovery on a tract of land a sufficient reason for placing a higher value on that land than it would otherwise have, then we might properly call brick making mining. Some distinction of this sort appears absolutely necessary in order to differentiate intelligently between mining and a vast group of manufacturing industries that use minerals.

There are in Michigan large tracts of land highly prized for their possibilities of containing valuable mineral deposits. These lands are mostly in the iron and copper regions of the Upper Peninsula. It has been a large feature of the work connected with this appraisal to tabulate the ownership and distribution of such lands, and attention has been given to the problem of working out a scheme of valuing them on a rational basis. The results will be taken up later in connection with the specific reports on the iron and copper fields. It is only worth while to point out here that the iron and copper ores of the Upper Peninsula have proved so valuable that their mere discovery carries a high commercial value. The mere chance of making such a discovery on a given tract of land is distinctly an asset. This is particularly true in the iron regions where the ores occur in masses of rock which are so unique that they can be instantly recognized, and in which the probability of discovery of merchantable ore is considerable. The finding of the "iron formation", therefore, can be considered a partial discovery of ore and it is undeniable that lands containing it have in the aggregate a large commercial value; a value that is not speculative but actual. But since we are now speaking of lands on which no merchantable discoveries have been made, we must admit that a valuation which may be reasonable for the aggregate of such lands may be wholly mistaken when applied to any particular tract.

MINING PLANTS NOT APPRAISED.

The value of a mine depends wholly upon the ore, that is, the equipment of a mine has no value except as applied to the ore. It is, therefore, useless to appraise mining plants as if they were in themselves an asset. It is true that a mine cannot be worked without equipment. A mine fully equipped is more valuable than a mere ore body without equipment, but this fact is fully taken into consideration in all appraisals. The point to be especially borne in mind is that mining equipment in itself is of no value; when the ore plays out the equipment is mere junk, no matter how costly it may have been in the first place; and this junk is so likely to be unsaleable that it is fully as likely to entail expense for watchmen and insurance as it is to yield any salvage. This fact may be surprising to many people but a little consideration will show that it is true. The equipment of a mine consists very largely of structures that cannot by any possibility be moved. The shafts and all other excavations are a part of the equipment. The buildings and machinery may occasionally yield some salvage but necessarily a small amount. It must be borne in mind that a large part of the expense of any installation of machinery consists of labor and materials for foundations, housing and erection. This is wholly lost when it is proposed to move the machine. Furthermore, the value of a machine depreciates rapidly on account of mere age.

MEANING OF APPRAISED VALUES.

The valuations in this report are intended to cover the value of the mining business of a company in each case. It includes all value that can be put on mineral lands and mining, milling and smelting equipment and mining supplies. It does not include property that can be valued for purposes other than mining, such as surface rights of any kind, agricultural or timbered lands, houses, stores, merchandise or cash.

(From page 34 to page 65.)

VALUE OF IRON ORE.

Unlike copper no specific figure can be given for the value of iron. The price of the ore varies according to its chemical and physical qualities. The expected future price of ore has been fixed for the purposes of this report on a calculated value for all grades based on the average quotations for standard ores for the past seven years. As a matter of fact the average for seven years differs very little from the average of the past five years.

These standard prices are fixed annually by the Lake Superior Iron Ore Association. The methods of figuring the price of ore from analysis is fully described in the hand book by Crowell & Murray, of Cleveland, (The Penton Publishing Company, of Cleveland, publishers). It is also explained in Rukard Hurd's Iron Ore Manual of the Lake Superior district (F. M. Catlin, Sales Agent, St. Paul, Minnesota). On account of the rather complicated nature of these calculations they are not described in this summary, but the average price received and the average price expected for the ore of each mine may be found in the tables of figures. The question arises whether the average price for the past seven years is a fair one for the future. As in the case of copper, the prices ruling for the season of 1911 are lower than the calculated average used. The considerations that impel me to use this average are precisely the same as those used in the case of copper, there being the same reasons to expect a continuance of the demand in the one case as in the other. The growth of the iron mining industry in Lake Superior shows some startling figures. The demand has been doubling every ten years. The shipments in 1910 from the whole region were 43,350,715 tons; in 1900 they were only 20,593,570 tons; in 1890—9,003,801 tons and in 1880—1,908,754 tons. While the shipments of one year occasionally fall behind those of the preceding year, it seems to me that no one can expect this prolonged and rapid growth to come to a sudden stop. To be sure, the resources of the region are sufficient to maintain an output of forty million tons a year for forty years taking only ore that is merchantable under present conditions so that at recurrent intervals the market may be glutted. But if the demand continues to increase in anything like the proportion that has ruled during the last thirty years, these known reserves will be exhausted in a much shorter time. At least three-quarters of all these reserves have been put in sight by the exploration of the Mesabi Range in Minnesota during the last twenty years. The discovery of new ore in that district has almost ceased, and it is to be expected that from now on the already known ore bodies will be in a progressively firmer commercial position. It is conservative to say the amount of new ore discovered in the Lake Superior region each year is not now more than keeping pace with the depletion of reserves. It is also probable that the progress of discovery is now proportionately more rapid in Michigan than in Minnesota.

Michigan has lost to Minnesota her former commanding position in the iron ore trade. In 1880 Michigan produced all of the iron ore shipped from Lake Superior; in 1890 it shipped more than 90%; in 1900 approximately 50%; in 1910 less than 30%. In spite of this proportionate loss, the tonnage shipped by the Michigan mines has steadily increased and may be expected to increase.

POSSIBLE EFFECT OF FOREIGN COMPETITION.

For the first time in many years, some of the Lake Superior iron producers are expressing uneasiness as to the effect of competition of iron ores from Cuba and Brazil, especially in view of the probable abolition of the tariff on iron ore. In Cuba there has been developed a reserve of iron ore amounting to three thousand million tons, all lying close to tidewater. The ore presents some disadvantages, being very high in moisture, so that while the dried ore runs something over 50% in metallic iron in its natural state, it contains less than 35%. This fact presents some Metallurgical difficulties which cost money to overcome. At present the ore is put through a process of "nodulizing" before shipment at a cost of *one dollar* a ton. The cost of mining and shipping to the coast is expected to be very small, the ore being really nothing but a ferruginous clay, forming a bed from ten to eighty feet thick on the surface of the ground, requiring no stripping or any preliminary work except to clear away the brush. It is said that this ore can be utilized without the "nodulizing" process, in which case it could probably be delivered at New York or Philadelphia at a cost of $1.25 a ton. At present, however, the nodulized ore must cost well over $2.25 a ton at our Atlantic ports.

Brazil also has a tremendous field of high-grade Bessemer iron ores, running 65 to 68% metallic iron. The field is, however, entirely undeveloped. It is situated 300 miles inland from the ports of Rio Janeiro and Victoria, and is reached by a railroad, but the railroad is such a poor one that it cannot be seriously used as a vehicle for bringing the ores to market. It appears that these ores might some time be delivered in Europe or the United States for a cost of about three dollars a ton. Lake Superior ores of the same grade would cost over five dollars a ton at Lake Erie ports and over seven dollars a ton on the seaboard.

I am satisfied, however, that competition from these fields can do nothing more than to curtail the rate of *expansion* of demand for the Lake Superior ores. It will not prevent shipments from continuing at the present rate or even from greatly increasing. I base this opinion on a very simple fact, viz: that the costs mentioned for Cuban and Brazilian ores are not given upon the same basis as those for Lake Superior ores. In the case of Cuba and Brazil the costs talked of are the bare operating costs, without any allowance for taxes, royalties or profits. A nodulized Cuban ore at the seaboard should be compared with a Lake Superior ore of the same grade at Cleveland on the same basis of cost. Admitting that 52% Cuban ore costs without taxes, royalties or profits, $2.25 a ton on the Atlantic coast let us see what the Lake Superior ore will cost on the same basis.

The United States Steel Corporation could deliver its average Mesabi ore at Cleveland for $1.50 a ton.

From its best mines it could deliver such an ore for $1.10 a ton. It could deliver ores mined underground from the Vermillion Range for less than two dollars a ton.

The whole product of the Gogebic Range in Michigan can be delivered at Cleveland at an absolute cost not exceeding $2.35 a ton, and large tonnages for $2.15 a ton.

A large tonnage can be delivered from the Marquette Range of Michigan for two dollars a ton. Large quantities of ore can be delivered from the Crystal Falls and Iron River districts for $1.75 a ton.

It is evident from these figures that the advantage of the Cuban ores is more apparent than real. No one is going to mine Cuban ores without paying taxes or without expecting profits. There are the further disadvantages of having to secure and invest a large capital to provide facilities for shipping the Cuban ore at all. This disadvantage is very much more pronounced still in the case of Brazil.

I do not argue from these considerations that either Brazilian or Cuban ores will not be used for making steel on our eastern coast, for I think they will, but I am satisfied that their effect on prices will be absolutely nil and that it will be a long time before their competition will be even felt in the region now supplied with iron from the Lake

Superior mines. At the most the foreign ores will affect the trade only on the sea-board. There is nothing in sight to challenge the dominance of the Lake mines in the whole interior of North America.

EFFECT OF TAKING OFF THE TARIFF ON MANUFACTURED IRON AND STEEL.

The same reasoning that applies to foreign ores applies to foreign manufactures in iron. They cannot come far inland. One consideration which is often forgotten is that the United States produces annually more iron than England and Germany together. "The tail cannot wag the dog." The gigantic thoroughly organized and establised iron industry of the United States cannot be overthrown or even seriously deranged by the surplus of Europe. The only probable effect of taking off the tariff altogether would be to prevent prices from going unduly high in boom times and to divide the markets along the coasts. The iron made from Lake Superior ores will have an undisputed field from the Hudson River to the Rocky Mountains and from the Ohio and Rio Grande to the Arctic Ocean.

I believe these statements can hardly be seriously disputed, and I recite them as reasons for my belief that the iron ore market will continue in the future on substantially the same course it has pursued in the past; that the demand is sure to increase, and that prices are more likely to be higher than they are to be lower than the average of the past seven years.

QUESTION OF ROYALTIES.

A large proportion of the iron ores are produced from leases, which usually have long terms, so that they might properly be called leaseholds. A majority of the operating companies pay royalties to fee owners and these royalties are to those operating companies a genuine and unavoidable expense. It is probably a uniform custom to make the holder of a lease responsible for all taxes on the lands he leases. It seems hardly fair in view of these facts to assess the operating companies on the royalties which they pay, because from their point of view the royalty is an expense and not a profit. But in answering the plain question which your Board asks, viz.: "What are these properties worth?" I cannot do otherwise than to consider royalties paid as net profits.

The amounts of these royalties are in every case tabulated, together with the ownerships of the fees to which these royalties belong.

TAXES.

You will find in the various tabulations of costs and values that taxes are treated wherever reported as a separate expense, and that the proportion of these taxes to operating profits is given. In making appraisals I have allowed each company under the head of General Expense as a portion of the mining cost the average amount of taxes they have paid per ton during the past five years.

TABULATION OF COSTS.

The iron mines of Michigan are usually described as occurring in three "Ranges"—the Gogebic, Marquette and Menominee, but for the purpose of showing the facts in the most intelligible manner, they have been divided into groups different from the usual classification. Our groupings are determined essentially upon a basis of comparative uniformity of geological occurrence, which necessarily determines the economic factors of cost and value as follows:

District No. 1.—The entire Gogebic Range in Michigan, Gogebic county;

District No. 2.—Iron River district, Iron county.

District No. 3.—Crystal Falls district, Iron county;

District No. 4.—Old Menominee district, Dickinson county;

District No. 5.—Western Marquette range, Baraga county.

District No. 6.—Marquette Hard Ore Mines, Marquette county;

District No. 7—Marquette Soft Ore Mines, Marquette county;

District No. 8—Swanzy district, Marquette county.

District No. 9—Various scattered low grade silicious mines, which produce ores under exceptional circumstances, and which have a limited market.

The results are presented in a separate tabulation for each of these districts. These tabulations show for the last five years—the total expenditures, the production and receipts from ore, the ore reserves reported, the total ore reserve counted on the calculation of the average value of ore from the grades reported in the ore reserves, the expected cost for the future based on a study of costs ruling in the past, and a valuation of each mine indicated by all the facts.

It is well to explain that the cost statements will show some inevitable differences in detail. Until all the mines keep their books in exactly the same way this is to be expected; but on the whole the variations are not very great. They mainly arise from the fact that one company may charge its expenditures for certain kinds of construction directly to mining, while another company might put such expenditures into a separate account, calling it "Construction." In the same way, there are certain variations in amounts charged to General Expense, explorations, etc. The student of mining costs will have no difficulty in seeing what the statements mean in each case.

EXPLORATIONS.

This title in the cost statements usually refers to a general campaign of search for ore by some of the larger companies. This work may or may not be on lands owned by the company. It is a practice to take options on likely pieces of land and spend money for geological research and explorations by drilling or test pitting. I have thought it fair to allow the companies who conduct their business in this manner for the cost per ton of all this work. It is spread uniformly over the tonnage produced by all the mines of such operating companies for the past five years. I assume, also, that this expense will be continued and, consequently, allow the same charge in my estimates for future cost.

GENERAL FACTS BEARING ON THE VALUE OF THE IRON MINES.

In comparison with the copper mines, the situation of the iron mines is distinctly more favorable. Several considerations contribute to this.

First: They are not facing any considerable deterioration in the metallic contents of their ores, nor are they facing the impending exhaustion of any commandingly important property. The probable downward limit of ore occurrence is no where in sight.

Second: The condition of their ore reserves is excellent, and this points to a continuance of production with almost absolute certainty for a period of twenty-five years in advance.

Third: In contrast to the paucity of discoveries in the Copper country, many new deposits have been discovered within recent years, so that in addition to the continuance of the present mines, there is reason to expect that new ones will continue to come in.

Fourth: The actual earnings of all iron properties in the five years under review were $57,400,000. This was earned by 78 mines on sales of 52,590,896 tons of ore. These are net profits over and above all expenditures, including the purchase of new equipment, many outside explorations and taxes. The copper mines earned fifty million dollars in the same period, but by far the greater part of this was earned during the years 1906 and 1907 when copper was abnormally high. Calculating on the normal price the earnings would have been only $41,200,000. In the case of iron mines the prices, and consequently, the earnings for the past five years were practically normal.

The actual ore in sight is sufficient to guarantee the production and earnings on the same basis for sixteen years. Without going further than this we can find reason for giving them a valuation of one hundred and fifteen million dollars. But it is practically as certain that the production can be maintained for twenty-five years as that it can continue sixteen years. With such a life the mines would be worth one hundred and fifty million dollars.

I am convinced that they are worth this amount, but, for two good reasons, it will be impossible to apportion the value among the various mines in order to bring them up to this total.

First: Because it is much easier to be sure of the endurance of a whole district than of a circumscribed tract covering a small part of the district.

Second: Important occurrences of ore are sometimes divided in ownerships in such a way as not only to diminish the probable profit to be obtained from them but also to throw doubt as to the proportion belonging to the different owners. Both these factors are constantly in evidence in all the districts.

VALIDITY OF ESTIMATES OF ORE RESERVES.

Our calculations are based on three elements:

First: Ore found in drill holes. In practically all cases we have been compelled to estimate this ourselves by the very simple method of measuring the area which the drill holes seem to demonstrate to be occupied by a continuous ore body, and multiplying this area in square feet by the average thickness of ore shown in the holes of the group. The number of cubic feet thus calculated gives the tonnage by dividing by the number of cubic feet representing a ton of ore in the district to which the ore body belongs.

There is some latitude for the exercise of judgment in determining the area to be considered as demonstrated, but in no case have we taken areas greater than can be obtained by drawing lines fifty feet outside of holes in ore.

Second: Ore reported by companies as being in sight above bottom levels of their mines.

Third: An additional amount of ore added on my own judgment of what is reasonable for extensions below the bottom levels.

Since all of these calculations are based upon documents submitted by the companies themselves, it is plain that only one element in the estimates on expected tonnage is open to serious dispute, viz.: the extent to which my judgment may be in error in assuming the extensions. Only a portion of this element can be open to question because it is patent that there must be some extensions.

DISTRICT NO. 1. GOGEBIC RANGE.

In this district no ore whatever is indicated by drill holes. We have to consider the following facts: The ore formation consists of a narrow band of ferruginous rock about eight hundred feet thick inclined to the north at an angle of seventy degrees and extending fifteen miles in Michigan from the Montreal River to a point east of Wakefield.

The following table shows the amount of ore shipped by these mines up to the end of 1910 and the amount reported in sight above the bottom levels:

	Tonnage shipped to end of 1910	Reported in sight	Total above present bottom levels
Ashland..........	5,618,390	197,000	5,815,390
Norrie...........	25,385,930	9,361,500	34,747,430
Newport..........	7,027,363	5,475,000	12,502,363
Puritan..........	159,590	50,000	209,590
Ironton..........	958,910	130,000	1,088,910
Yale.............	481,426	0	481,426
Colby............	2,645,101	815,800	3,460,901
Tilden...........	5,188,572	404,500	5,593,072
Anvil and Palms..	2,058,686	379,000	2,437,686
Eureka...........	503,745	65,000	568,745
Asteroid.........	0	10,000	10,000
Mikado...........	1,049,800	20,000	1,069,800
Chicago..........	68,727	184,000	253,727
Brothorton.......	1,855,124	995,000	1,950,124
Sunday Lake......	1,422,461	150,000	1,572,461
Castile..........	55,444	1,000	56,444
Total.......	54,479,269	17,338,800	71,818,069

To this figure of 71,817,000 should be added 3,600,000 tons additional for a correction, which I will not take time to explain, giving a total showing of 75,400,000 tons above the average bottom level, which is 1,450 feet deep.

Now, we find that on the bottom levels there is exposed in this range a total area of 662,000 square feet of ore avoiding all duplicate sections of any ore body and, since ten cubic feet will make a ton this is equal to 66,000 tons for every additional vertical foot. Working this back toward the surface we find that the depth of 1,450 feet would mean more than ninety million tons instead of the seventy-five million tons accounted for. In other words, the showing of ore on the bottom levels is actually better than the average of the mines during their past history. Furthermore, the deepest of the mines is 2,140 feet deep, being seven hundred feet lower than the average. At this depth the showing of at least one ore body is magnificent and it will surely go much deeper. With these facts in view no intelligent mining man will disagree with the opinion that large additions to the measurable reserves is absolutely called for before any adequate figure for the valuation of the mines can be reached. It is perfectly rational to expect them to produce as much ore in the future as they have in the past. However, I have been cautious in assuming great extensions.

NORRIE MINE.

The property is two miles long. One section at the west end is developed down to the vertical depth of 1,592 feet. Along the central section of the bottom level is approximately 1,200 feet and toward the east end 1,445 feet. We may say that this mine is developed to an average depth of 1,400 feet. Above this level there are reported in sight 9,361,500 tons of ore. One great ore body at the east end of this property is developed to a depth of 1,445 feet. It is known to be the same ore body which has been developed in the neighboring Newport Mines to the east to the additional depth of 388 feet. The area of the Norrie in this body is 182,000 square feet. In the Newport on the 1,940 foot level the area is 306,000 square feet. The average of these two sections is 244,000 square feet. This gives a volume of 9,-

467,000 tons of ore between these two levels, of which 7,200,000 is accounted for and the remainder 2,271,000 is to be added to the Norrie. This whole amount has to be added to the ore reserves reported being the total of assured ore up to over 11,600,000 tons.

In the central and western portions of the mine there is exposed a total area of 205,000 square feet of ore at the bottom, of which 195,000 square feet is only developed to the 1,200 foot level. The smaller ore body is just entering the property at the extreme west end at a depth of 1,592 feet. If the great Central ore body goes down merely to the depth demonstrated for the smaller Western body it will yield seven millions additional. If it goes down to the depth to which the Eastern ore body is developed on the Newport, 2,140 feet, it will yield an additional sixteen million tons. But for our purposes I only add a modest 6,400,000 tons for the continuation of these bodies bringing up my total estimate for the Norrie to about 18,000,000 tons, which is sufficient to last the mine at the rate of its average sales for the last five years, for seventeen years. It is almost needless to say that this estimate is moderate and undoubtedly below the expectations of the owners.

NEWPORT MINE.

This is the deepest mine not only on the Gogebic Range but in the whole Lake Superior iron region. It is now working principally upon a great body of ore which has descended into it from the Westward through the Norrie property. Above the 2,140 foot level there is reported in sight 5,475,000 tons. To this can be added, with absolute confidence, 3,600,000 tons, merely by assuming that the developments on the 2,140 level will show the ore to be as large on that level as it is on the 1,940 level. This development has already progressed enough to demonstrate it as a practical certainty. This makes our estimate nine million tons assured. The question remains how much ore should be allowed below the 2,140 foot level. An assumed extension of 270 feet additional depth would give us eight million tons. Another assumption based on the possible termination of the ore body against a certain dyke about one thousand feet to the eastward of the center point of the present ore body gives approximately the same estimate, viz.: eight million tons. If we use this we might assume a total of some seventeen million tons for this property. This is entirely reasonable because it is based only on one ore body. The Norrie mine shows two other large ore bodies below the one on which the Newport is working, and both pitching eastward into the Newport property. Absolutely nothing is known about the depth to which this mineralization may extend. I am satisfied that an expected life of twenty years at 800,000 tons a year will not meet with serious dissent on the part of the owners.

OTHER MINES ON THE GOGEBIC.

It will be noticed that the Norrie and Newport together have shipped 60% of the whole output of the District. They are credited with 80% of ore reserves. During the past five years they have made 75% of the profits of the district.

These comparisons are more than reflected in the valuations put on mines, the Newport and Norrie together accounting for approximately 84% of the valuation. I am satisfied that this proportion for the Newport and Norrie is too high and too low for the others. But it is not on the whole unfair to the operating companies because the Norrie Mine is owned by the Oliver Iron Mining Company, which also controls the Tilden, Puritan, Geneva, Davis and Chicago properties. These mines cover an important part of the range outside of the great central ore body, but in all cases I have given them either no value at all or merely a nominal value because the ore reserves are small and the costs have been high.

The Newport Mining Company controls, beside its main mine, the Anvil and Palms, on which an exceedingly promising ore body has been found. It will probably prove to have a much higher value than I have given it.

The other mines are given tonnage somewhat in proportion to their past records.

The Colby Mine I am crediting with an expectation of fifteen hundred thousand tons to be mined in ten years. This property has shipped in the past 2,645,000 tons and reports 815,000 in sight, making a total of 3,460,000 tons. The mine gives no indication of being bottomed or worked out, and I have added for extensions of its present ore bodies 20% for ore yet undeveloped. I am satisfied that it will produce more.

The Ironton Mine has shipped 958,000 tons and reports in sight 130,000 tons, giving a total of 1,088,000 tons. It has recently cut an ore body in the north formation, which from its position is probably important. I think it reasonable to assume, therefore, that the mine will develop ore equal to a third of that it can account for at present.

The Mikado Mine has shipped 1,050,000 tons and reports 20,000 in sight. Since this mine shows no indication whatever of playing out, I think it reasonable to assume that it will produce half a million tons more, largely because it is improving in the bottom after passing one or two rather poor levels.

The Brotherton and Sunday Lake Mines together account for more than 3,500,000 tons of ore. They are working on the same ore body which seems to be pitching to the eastward. It shows remarkable continuity and is improving. The bottom level, 1,068 feet deep in each, shows a continuous body of ore 1,700 feet long with an area of excellent ore 61,000 square feet. It is divided about equally between the two properties. This is equal to 6,000 tons per vertical foot. I think it fair to assume that this ore body will produce 2,500,000 at least. On account of the pitch towards the Sunday Lake I give that property three-fifths of this expected tonnage.

For the district as a whole, it will appear from the table that I have seen fit to increase the tonnage reported in sight from 17,400,000 to 42,900,000. Of this increase I consider 11,000,000 tons to be practically demonstrated, bringing the total of demonstrated ore up to 28,400,000. I am assuming 14,500,000 tons more for extensions of the principal ore bodies beyond their present bottom levels. This means an extension of less than 300 feet in depth and increasing their present depth only 20%.

VALUATION IN DISTRICT NO. 1.

A high average grade and consequent high value of the ore of this district makes the value of its mines higher than the other districts, in spite of the fact that the expected tonnage is less than in some of the others.

The total valuation of the group is $41,560,000 based on an expected future product of 43,000,000 tons and an annual output of about 2,900,000 tons.

DISTRICT NO. 2. IRON RIVER.

Dr. Leith describes this district as follows:

"The ores are in closely folded upper Huronian slates. The iron formation lenses are uniformly steep dipping. In a large way they have a distinct linear trend but almost every property shows major and minor buckles and considerable narrowing or widening of the formation. The walls of the ore body may be all slate, all jasper or any combination of the two. The larger ore bodies occur in places where formation has been thickened by folding. The axes of these folds are favorable places for the concentration of ore. They have steep pitches and should have great persistence in depth. * * * As would be expected under these conditions, individual ore bodies have the greatest irregularity in outline, although looked at in a large way, they may conform to the major trend of the district. The under-ground developments are yet shallow, the deepest mine being 690 feet deep and the average being about 450 feet. Drilling, however, has shown the ore to go down to a depth of 1,712 feet."

The active mines show the following record to the end of 1910:

	Tons shipped	Tons in sight above bottom	Total
Osana (James)........	231,359	520,000	751,359
Chatham..............	181,427	43,000	224,427
Hiawatha.............	614,496	254,993	869,489
Baker................	84,420	....	84,420
Dober................	2,195,146	372,259	2,567,405
Baltic...............	1,340,593	713,000	2,053,593
Fogarty..............	168,936	460,000	628,936
Caspian..............	699,305	3,505,500	4,204,805
Youngs...............	473,784	250,000	723,784
Zimmerman............	37,690	1,000,000	1,037,690
Berkshire............	135,734	563,000	698,734
Total...........	6,162,890	7,681,752	13,844,642

reaches the state of development in which the other districts now are. It contains one of the greatest ore reserves in Michigan, if not quite the largest.

DAVIDSON MINE.

This property is still in the developing stage, having shipped no ore. It reports 2,000,000 tons in sight which is a reasonable estimate.

OSANA MINE.

This property has a tremendous showing on its bottom level, no less than 159,000 square feet of ore being exposed at a depth of 300 feet below the rock surface. The ore body is apparently irregular for the third level shows a cross section of only 20,625 square feet. I have no hesitation in raising the tonnage to be expected from this mine to 2,000,000 tons.

WAUSECA MINE.

This property has shipped no ore but shows two levels each with a cross section of approximately 30,000 square feet. The lowest levels are the bottom level being 400 feet deep. The company reports 40,000 tons in sight but I have no hesitation in increasing this amount to half a million and adding another half million for good measure, which will bring the total expectation up to 1,000,000 tons.

NANAIMO MINE.

This property is described as exhausted.

CHATHAM MINE.

This property reports 43,000 tons in sight with an exposure in bottom level of 6,000 square feet. I count on it for 100,000 tons.

HIAWATHA MINE.

Reports 254,993 tons in sight with an exposure of 32,000 square feet on the bottom level. It accounts for nearly 900,-

000 tons with a depth of 575 feet below the rock surface. Apparently the mine is as good as ever, and a million tons is a reasonable estimate for its future.

CHICAGO MINE.

This company has shipped no ore but reports 390,305 tons in sight above the bottom level which is 500 feet deep, and shows an area of 13,000 square feet of ore. 600,000 tons is a reasonable estimate for this mine.

TULLY AND BAKER.

The Baker is a small property which contains an ore body that has worked across the line of the neighboring Tully Mine to the westward. The Tully shows three important ore bodies by drilling. A conservative estimate of these shows up 3,500,000 tons. Nothing was reported in sight.

MICHAEL'S AND BLAIR'S EXPLORATIONS.

On the Michael property ore is shown up in drilling at a depth of 1,712 feet. Five holes show an average depth of 210 feet in ore. There is, at least, 1,000,000 tons indicated here, but on account of its depth it will not be available for a long time.

MCGILLIS, DOBER AND ISABELLA MINES.

These properties are all owned by the Oliver Iron Mining Company and account for 2,500,000 tons above a depth of 690 feet. The total area of ore exposed at the bottom of these mines is 47,600 square feet, enough to make 4,000 tons per vertical foot. It seems safe to add 40% of the total ore accounted for, for future expectations which will be equal to 1,000,000 tons in addition to 372,000 tons reported in sight making about 1,400,000 tons.

BALTIC AND FOGARTY MINES.

These mines are operated together. The Baltic accounts for 2,050,000 tons of ore above the 450 level. This means about 4,500 tons per vertical foot which is accounted for by an average cross-section of 54,000 square feet. The lowest developed level shows an area of 74,000 square feet, enough to make more than 6,000 tons per vertical foot. It is perfectly safe to add 1,000,000 tons for additional ore in this property, making a total expectation of 1,700,000 tons. The Fogarty is only 265 feet deep, of which a considerable part is occupied by surface gravel. At this depth it accounts for a total of 630,000 tons, of which 460,000 tons are in sight. Its bottom level shows an area of 74,800 feet. There is every reason to expect that this mine will prove as productive as the Baltic, which will enable us to add 2,500,000 tons as a reasonable extension, giving it nearly 3,000,000 tons for the future.

CASPIAN MINE.

The Caspian Mine accounts for 4,200,000 tons above the bottom level which is 290 feet deep, the sand being probably more than 100 feet on the average. This mine has one of the largest ore bodies in the whole Lake Superior region, showing on its bottom level a cross section of 377,000 square feet, or about 8 and one-half acres between vertical walls. This is sufficient to make more than 30,000 tons for each vertical foot. The ore is actually known to occur 100 feet deeper than the present bottom and immediately north and in its trend drill holes show great quantities of ore at more than 1,300 feet deep. I have not the slightest hesitation in counting on this mine for 10,000,000 tons of ore, which is sufficient to maintain an output of 400,000 tons a year for 25 years.

HOULIHAN MINE.

This property is north of the Caspian. One partially developed level immediately under the sand shows a cross-section of 167,000 square feet. It may prove to be as large as the Caspian but I give it a tonnage of only 5,000,000 tons, this being sufficient to maintain an output of 250,000 tons a year for 20 years.

YOUNGS MINE.

This property reports a total of 725,000 tons of ore, of which 250,000 tons are in sight above the 418 foot level. Part of the ore is pitching northward onto the neighboring Fogarty mine. It shows an area in the bottom of 42,000 square feet, enough to make 3,500 tons per vertical foot. A reasonable extension for such an ore body would be 750,000 tons, bringing the total expectation up to 1,000,000 for the future.

ZIMMERMAN MINE.

This property shows on one fully developed level an area of 50,000 square feet of ore. Ore is shown in a drill hole 200 feet below this level. The company counts on 1,000,000 tons, which is a very reasonable estimate.

BERKSHIRE MINE.

This property accounts for about 700,000 tons above the bottom level which is about 300 feet below the rock surface. It reports 563,000 tons in sight and on its lowest developed level shows a cross-section of 25,500 square feet. 1,000,000 tons is a reasonable expectation for the future of this mine.

ROGERS MINE.

This property is still in the development stage, but shows up a very large amount of ore by drilling. I estimate the mine at 2,500,000 tons, but it is not all merchantable, some of it being mixed with manganese.

The total amount of ore apportioned among the Iron River mines is only 42,000,000 tons which I believe, as explained above, is far less than may reasonably be expected. Nevertheless it is sufficient to maintain the average tonnage of the past five years for fifty years and gives these mines all the present values that can be charged against them at present with propriety. An extension of life beyond fifty years has little or no present value. The demand for ores in this district is moderate, although it will probably increase rapidly from now on. At present the biggest mines in the district are shut down. On account of the patent fact that almost every mine in the district has enough ore to keep up its output at the rate at which it can be marketed for 15 or 20 years, I have not thought it worth while to make any effort to estimate the ore with any great care.

	Tons shipped	Tons in sight above bottom	Total
Hollister............	96,416	....	96,416
Crystal Falls........	1,735,251	42,000	1,777,251
McDonald.............	7,166	10,000	17,166
Bristol..............	2,456,100	522,000	2,978,100
Armenia..............	377,081	50,300	427,381
Great Western........	1,952,937	97,300	2,050,237
Tobin................	1,630,549	135,300	1,765,849
Dunn.................	1,658,015	67,000	1,725,015
Michigan.............	171,719	78,000	249,719
Hemlock..............	1,705,226	125,000	1,830,226
Mansfield............	1,217,355	32,000	1,249,355
Total...........	13,007,815	1,158,900	14,166,715

DISTRICT NO. 3. CRYSTAL FALLS.

Dr. Leith has the following to say about this district:

"The ores are in upper Huronian slates, except for the Mansfield, which is in a band of slates in the hemlock volcanics, and the Groveland which lies at the base of the upper Huronian series in the Felch schist. As in the Iron River district, the iron formation lenses are steeply tilted, much folded and show great variations in thickness. The walls may be slate or jasper, or any combination of the two. The larger ore bodies occur in folds in the iron formation, which have thickened the iron formation. The pitch of these folds has considerable persistence in depth. There are few forties containing iron formation where some ore has not been found."

He also says, "in addition to the ore shown in mines, there are 467,000 square feet of ore shown by drilling, which by conservative estimate indicates 1,412,000 tons."

The active mines of the district show the following record to the end of 1910:

These mines are estimated by Dr. Leith to have an average depth of 1,023 feet, weighted according to the tonnage extracted. When we come to compare the bottom areas with the ore extracted to this depth; allowing 12 cubic feet to the ton of ore, we find that the present bottom area exceeds that of the average area in the past by nearly 30 per cent, the total tonnage accounted for being 14,000,000 tons, which means that about 14,000 tons has been the average per vertical foot, which would give an average horizontal cross-section of 168,000 square feet. The actual cross-section at the bottoms is 207,250 square feet. This showing is exceedingly favorable. It is probably safe to add for future discovery an amount equal to 50% of what has been accounted for to date.

HOLLISTER MINE.

This is an unprofitable mine with an insignificant showing. I make no estimate for it. The same thing may be said of the McDonald.

MANSFIELD MINE.

The Mansfield Mine is 1,200 feet deep. That depth accounts for 1,250,000 tons, which means 10,400 tons per vertical foot and a cross-section of 12,500 square feet for the average. The deposit is diminishing in size so slowly that there is little danger in assuming that its probable extension will amount to about 500,000 tons. This is equal to a product of 75,000 tons a year for seven years.

BRISTOL MINE.

This property at a depth of 960 feet accounts for close to 3,000,000 tons, which is equivalent to 3,200 tons per vertical foot, indicating an average cross-section of 38,000 square feet. This is now diminished at the bottom to 26,000, indicating a diminution of 2,500 square feet for each 100 feet additional depth. This indicates that the mine would be bottomed at a depth of 2,000 feet and that the additional tonnage expected might be estimated at about 1,000,000 tons. This in addition to 522,000 tons reported in sight, gives an expectation of approximately one and one-half million tons.

This is sufficient to maintain an output of 250,000 tons for six years.

ARMENIA MINE.

The bottom level is 566 feet deep and the total accounted for is 427,000 tons. This indicates an average of less than 800 tons per vertical foot, which would be provided for by ore bodies having an average cross section of less than 10,000 square feet. At the bottom the mine shows an area of 20,500 square feet in ore. It is perfectly safe to count on this mine for half a million tons additional ore. This, with the amount reported in sight, is sufficient to maintain a tonnage of 55,000 tons for ten years.

GREAT WESTERN.

This property has on the 1,157 foot level an area of 33,000 square feet. Above this it accounts for a total of 2,050,000 tons, indicating an average of almost 2,000 tons per vertical foot, which would be provided by ore bodies having an average cross-section of 24,000 square feet. The area of the bottom level is 33,000 square feet, enough to produce 2,750 tons per vertical foot. Ore has actually been reached at the 1,267 foot level. The condition of the property is apparently excellent, and I have no hesitation in adding an expectation of 700,000 tons to the amount reported. This will give 800,000 tons, or enough to maintain an output of 100,000 tons a year for eight years.

TOBIN AND GENESEE.

This mine down to the 1,100 foot level accounts for a tonnage of 1,765,000 tons, equal to 1,500 tons per vertical foot, which would be provided by an average cross-section of ore of 18,000 square feet. The mine shows an area of ore on the bottom level equal to 65,000 square feet, sufficient to make 5,400 tons per vertical foot. This has actually been demonstrated to continue 125 feet deeper, which would enable us to estimate 675,000 tons more. This, with the amount reported in sight, namely, 135,000 tons, gives us 810,000 tons. I have no hesitation in figuring that this mine is not more than half worked out, and assuming that it will produce as much in the future as accounted for in the past, 1,765,000 tons, which is sufficient to maintain a tonnage of 200,000 tons a year for nearly nine years.

CRYSTAL FALLS MINE.

The Crystal Falls Mine is 1,063 feet deep and has produced and (at that depth) can account for nearly 1,800,000 tons, or approximately 1,700 tons per vertical foot, which requires an average cross-section of 21,000 square feet. The bottom level shows only 17,000 square feet, indicating some weakening, but nothing very serious. It is safe to count on this mine producing half a million tons more, equal to 50,000 tons a year for ten years.

DUNN MINE.

This property is 1,500 feet deep and its ore body has reached the boundary line. I count on it for only about 117,000 tons.

MICHIGAN MINE.

This property accounts for 250,000 tons at a depth of 600 feet. The output would be produced by an ore body having an average cross-section of 5,000 square feet. At the bottom the mine shows an area of 2,880 square feet in ore. It is getting rather small and I do not count on the property producing more than 100,000 tons which is only 22,000 tons more than is reported in sight.

HEMLOCK MINE.

This property is 935 feet deep and accounts for 1,830,000 tons. Its lowest developed level shows an area of 22,000 square feet, but a still lower level has failed to find the ore. On this account only half a level is allowed below the 935 foot level, giving 55,000 tons to be added to reported estimate of 125,000 tons, or a total of 180,000 tons.

VALUATIONS IN DISTRICT NO. 3.

In all cases I am allowing for increase of mining costs due to increasing depths and the exhaustion of the mines. I am counting on the active mines for an annual product of only 880,000 tons against annual shipments of 1,220,000 tons for the past five years, the expectation being that the falling off in this district will be made up in the Iron River district. Ore found in drill holes is appraised on a basis similar to that of Iron River.

The total valuation of the district is placed at $6,297,000 and an expected tonnage of 8,064,000 tons. This is equivalent to about seventy-five cents a ton for the expected ore as against only forty cents for Iron River district. This difference in valuation is caused by the difference in the expected life of the properties.

DISTRICT NO. 4. OLD MENOMINEE RANGE.

The active mines present the following record to the end of 1910:

	Tons shipped	Tons in sight above bottom	Total
Penn Iron Mining Co...	8,845,135	1,437,265	10,282,400
Pewabic................	7,317,165	1,233,000	8,550,165
Loretto................	1,311,068	1,107,424	2,418,492
Chapin.................	17,649,477	4,194,679	21,844,156
Aragon................	6,077,327	1,085,000	7,162,327
Millie..................	368,267	20,000	388,267
Total............	41,568,439	9,077,368	50,645,807

Dr. Leith has the following to say in regard to the ores of this district:

"The ores are partly in tabular bodies paralleled to bedding, and partly in more or less well developed pitching folds bottomed by dolomite, talc-schist or slate and are, therefore, elongated in the direction of the pitch. The degree to which the ore is found to follow these pitches varies in different mines and in different parts of the same mine; in general, the pitches being less well developed near the surface than below. The folds unquestionably pitch a long distance below the present bottom levels and there seems to be no reason geologically in the character of the rock and alterations or other features of the bottom levels, why the ore, at least for shallower mines, should not continue on these pitches to as great a distance below the surface as have been reached by the deepest mines of the district, and probably even greater depths.''

Dr. Leith also states, ''The total area of ore on fully developed bottom levels of the Menominee district in which the ore is not known to be cut off by rock or pitching off the property within a limited distance, is 263,435 square feet. The average depths of these bottom levels, weighted according to tonnage, which has been shipped from the mine is 1,160 feet. If the ore shown in bottom levels continues with present areas to the depth of the deepest known ore, this would give 6,320,000 tons as probable ore for the district.''

The salient facts which appeal to me are the following: The total amount of ore accounted for above the 1,160 foot level is 50,645,807 tons. This means that the average horizontal area of the ore bodies has been in the past approximately 440,000 square feet. If we assume that this area is normal for the 580 foot level and that for the 1,160 foot level the area is only 263,000 square feet, we get a diminution of approximately 180,000 square feet in 600 feet. This means that each additional 100 feet in depth means a diminution of area of 30,000 square feet. On this basis we might assume that the ore would vanish at a depth of 1,900 feet. This assumption would leave us below the present bottoms approximately 9,000,000 tons.

PENN IRON MINING COMPANY.

This company owns the Cyclops, Norway, East and West Vulcan, Curry and Brier Hill mines, covering a length of three miles along the Menominee Iron Ore formation. It shows at an average depth of 930 feet—71,245 square feet of ore. It accounts for a total of 10,282,000 tons in a vertical producing depth of 900 feet. We may assume that at a depth of 450 feet, the average horizontal area of the ore bodies would have been 115,000 square feet which is diminished at the present bottom to 71,000. This means a diminution for each 100 feet of approximately 10,000 square feet of area and points to a probable tonnage yet to be opened up of 2,400,000 tons. Adding this to 1,437,000 tons in sight would give a probable future tonnage of 3,800,000 tons which is enough to last a mine at its average production for ten years.

As a matter of fact these mines have as much in sight now as they ever had; considerable additions in the last two or three years having been made to the tonnage in sight. Our figures mean that an assumption is made that ore will be found in the future equivalent to 23% of what has been found in the past.

PEWABIC MINE.

This was formerly a very high grade and profitable mine, but it has been bottomed. No estimate whatever is made for continuance.

CHAPIN MINE.

This great property shows at a depth of 1,400 feet an area of ore amounting to 140,000 square feet. Above this level it accounts for 21,844,000 tons. The average cross-section assumed at 700 feet depth was only 160,000 square feet. The diminution in volume with depth, therefore, is slow and the prospects for the future are considerable. The developments on the bottom level, however, are not quite so favorable as they look, and I would assume that the mine will be bottomed at the same increase of depth as in the case of the Penn. This will give us about 4,900,000 tons, or again, about 23% as much as has been discovered in the past. This amount added to what is reported in sight gives 9,000,000 tons for the property, sufficient to maintain an output of 600,000 tons for 15 years.

ARAGON MINE.

This property shows at a depth of 1,100 feet an area of developed ore of 31,000 square feet. It accounts for 7,200,000 tons above this level which means an average section of 65,000 square feet, and a diminution of 6,500 feet for each level.

This means that the mine will be bottomed at 500 feet deeper and gives us an additional tonnage of only 750,000 tons. My calculation, therefore, for this mine is that it can produce this amount in addition to 1,085,000 tons reported in sight, in all 1,800,000 tons, sufficient to maintain an output of 180,000 tons for ten years.

LORETTO MINE.

At a depth of 800 feet, this mine shows a cross-section of 21,200 square feet. The average in the past has been over 30,000 square feet. It is losing volume, therefore, at a rate of about 2,250 square feet for each level, which would bottom the mine at a depth of 1,700 feet and justifies an expected extension of tonnage equal to about 900,000 tons. We can, therefore, give this mine a total expectation of 2,000,000 tons, and a life of twenty years at 100,000 tons a year.

MILLIE MINE.

This property only shows 20,000 tons in sight and shipments of 368,000 tons in the past. On account of certain developments in the Chapin Mine immediately below it and to the westward, I think it fair to assume that this mine can produce as much ore in the future as it has in the past.

VALUATIONS IN DISTRICT NO. 4.

It will be noted that this is the least promising in Michigan for the future. It has been shipping annually more than 1,860,000 tons. I am counting on a product for the future of only 1,540,000 tons, expecting as in the case of Crystal Falls that the falling off will be made up in Iron River. The total valuation of these mines is $11,391,000 based on an expected tonnage of 18,233,000 tons.

DISTRICT NO. 5.

MINES OF THE WESTERN MARQUETTE RANGE IN BARAGA COUNTY.

This district has never been profitable to any considerable extent. It contains only four mines which are spasmodically active, namely, the Imperial, belonging to the Cleveland

Cliffs Company, and the Ohio, Portland and Beaufort, belonging to the Niagara Iron Mining Company.

The Imperial reports	1,500,000 tons.
The Ohio reports	117,000 tons.
The Portland reports	247,000 tons.

There is no occasion to add anything to the estimate of the Imperial. Dr. Leith finds reason to add 200,000 tons of probable ore to the Ohio and Beaufort, bringing the total of this district up to 2,064,000 tons.

VALUATIONS IN DISTRICT NO. 5.

The only mine in this group that has any pretensions as to value is the Imperial, which is put down at $335,000.

DISTRICT NO. 6. MARQUETTE HARD ORE MINES.

The record of shipments of the active mines of this district is not easy to obtain because the mining companies report hard ores and soft ores together. The distribution of tonnages for this and District No. 7 is only approximate.

Dr. Leith describes this group as follows:

"The ores at the top of the Negaunee formation just below the Goodrich quartzite are throughout the district hard hematites, locally more or less specular and magnetic. In certain of the mines the basal conglomerate of the upper Huronian which rests against these ores is also sufficiently rich to be mined and constitutes a part of the ore bodies. The ore bodies are tabular in shape parallel to the steep dipping contact of the Negaunee and Goodrich quartzite, though locally folded and faulted. Soft hematite is locally found in these mines in the jasper foot wall. In the Section 16 mine the hematite and hard ore have come together on the bottom level, and the soft ore is becoming relatively more abundant."

"The aggregate area of bottom levels of such of these mines as have not been nearly exhausted is 350,000 square feet. The average depth of producing mines not weighted according to tonnage is 1,041 feet. These ores have been mined to a depth of 1,984 feet at Champion and this group, as a whole, constitutes the deepest of the Marquette mines.

The persistence of the ore-bearing horizons to the present levels is taken to promise well for still further persistence in depth.''

REPUBLIC.

This property at a depth of 1,900 feet has shipped 6,344,000 tons and reports in sight 1,358,000 tons making a total of 7,800,000 tons. The ore is very dense and seven cubic feet of it, in place, makes a ton. Two ore bodies at or near the bottom show an area of 35,000 square feet, sufficient to make 5,000 tons to the vertical foot, but one of them is weakening. Still, in view of the fact that the showing of ore at the bottom, if projected to the surface, is sufficient to account for the whole tonnage mined to date; the mine may be said to look very well at the bottom and I think it reasonable to add an expectation of 20% of the amount already accounted for for future discovery. This makes a total expected tonnage of 2,900,000 tons.

WASHINGTON AND BARRON.

These properties have had a spasmodic activity for forty years and have not been very profitable. They have produced altogether probably a million tons, and report 300,000 tons in sight, which Dr. Leith increased to 432,000 tons.

AMERICAN.

This property also has been worked spasmodically. It produces a good grade of ore and has recently been profitable. No estimate of ore in sight was turned in by the company, but Dr. Leith estimates it at 500,000 tons.

VOLUNTEER.

This property is really producing at present soft ore, but it has in former years produced hard ore. It is not much more than a prospect. It only reports 30,000 tons in sight, but some drilling indicates a considerable ore body and I place its future expectation at 150,000 tons.

LAKE SUPERIOR HARD ORE.

There is some uncertainty as to the location of certain tonnages reported by the Oliver Iron Mining Company for the Lake Superior group. The Hard Ore, Section 16 and Section 21 mines are treated as a unit. I take it that any mistakes in apportioning tonnage to these mines will not be of consequence on account of unity of ownership. Dr. Leith's inquiries at the company's office showed that they counted on the Hard Ore mine for 1,470,000 tons in sight. A neighboring property which will undoubtedly be operated by this plant shows by drilling the continuation of an ore body worked out by the Cleveland Cliffs Company at the old Morrow mine. The ore is on an 80-acre tract. From drill records a rather optimistic estimate was made by the local engineers of 1,500,000 tons, but the Morrow mine accounts for a final total of only 900,000 tons. I do not think more than 800,000 tons should be credited to this reserve. This makes a total of 2,270,000 tons for the old Hard Ore mine.

This is an interesting old property which has been worked for more than fifty years and apparently is good for twenty years at a moderate output.

SECTION 16.

Some of the ores from this property are soft ores. The amount reported in sight is 5,311,355 tons. The bottom level 1,080 feet deep shows an area in ore of 168,000 square feet. On account of the dense character of the ore, only 8 or 9 cubic feet is required for a ton. Below this level ore is shown to go down 155 feet. Now since the bottom level shows an area capable of producing about 20,000 tons per vertical foot, we might assume that if the ore body holds its volume this increase of depth would yield about 3,000,000 tons. Dr. Leith reports a probable extension amounting to 4,135,000 tons and an expected total of 9,446,000 tons. Dr. Leith and I both agree that this estimate seems rather optimistic, but, at any rate, the tonnage to be counted on is surely sufficient to keep up the production to the capacity of the equipment, say 300,000 tons a year for twenty-five years. This is long enough to establish the present value.

CHAMPION MINE.

This property has been working spasmodically for many years. Its bottom level is 1,984 feet deep with an area of 40,000 square feet. The amount reported in sight is 1,625,000 tons. This with the former shipments of 4,413,000 tons makes the mine account for more than 6,000,000 tons to its present depth. As in the case of most of the other mines of this class where there is no considerable deterioration, I think it fair to assume that an additional 20% can be added safely. On this basis the mine can produce 2,825,000 tons, sufficient to maintain an output of 100,000 tons a year for twenty-eight years.

THE CLIFFS SHAFT.

This mine reports available 2,167,000 tons. A certain area has a possibility of adding 1,800,000 tons more, but as nothing is sure, I make only a slight addition to the tonnage reported available, bringing it up to 2,500,000 tons. This is sufficient to keep the mine going at 250,000 tons a year for ten years.

NORTH LAKE NO. 2 ORE BODY.

This property reports 594,000 tons.

Cleveland Cliffs Co. reports drilling in the vicinity of Ishpeming on which Dr. Leith estimates 629,000 tons of ore not at present available.

VALUATION IN DISTRICT NO. 6.

These mines are generally long-lived and while some moderate increase of cost may be expected in the future, the conditions may be counted on to remain substantially as they have been in the past. The tabulation shows an expected annual tonnage of 1,224,000 tons as against an average tonnage shipped of slightly under 800,000 tons. The difference here is apparent, not real, because the shipments from the Lake Superior group have not been properly apportioned between the hard and soft ore mines.

The total valuation of the group is $12,132,000 on a total expected tonnage of 21,667,000 tons.

DISTRICT NO. 7.—MARQUETTE SOFT ORE MINES.

This district rivals the Iron River in its promise for the future. It is hardly possible to give a summary of the past shipments of these mines because the shipments reported include very large mixtures from the mines of District No. 6.

Dr. Leith has the following to say regarding this group:

''The ore bodies are located with the Negaunee formation in its middle and lower horizons and show great variety of shape. In the Negaunee basin, it is a gently folded and faulted sheet, with comparatively low pitch to the south of west. In the Prince of Wales, Breitung No. 2, Mary Charlotte, Rolling Mill and Cambria and Hartford areas the tabular development is less well marked, the ore bodies occurring in more or less shallow channel-like lenses in the jasper with relatively low pitch with great local irregularities and cut by dikes. In the Lake Angeline area the ores are in sharp troughs in greenstone. The bottoms of these troughs have relatively low pitch.''

''The aggregate total area of bottom levels of the mines of this group is about 1,045,000 square feet, but in view of the fact that the ore bodies have, in general, a low pitch, this aggregate area can not be fairly compared with the areas of the hard ore mines in this district, or of the ores of the Menominee, Crystal Falls, Iron River and Gogebic districts. More closely correlative would be the area of a section across the pitch. With a flat pitch the projection of present bottom levels downward would involve so large a lateral migration that in a number of cases they go off the property. It is apparent also with the flatness of the pitch that the areas or cross-sections in adjacent properties are frequently duplicates, the same ore body running through both properties and being cut at different elevations.''

''Drilling in the soft ore horizon has disclosed a vast amount of ore and has opened up possibilities which will not be exhausted for many years. The most notable results of this drilling have been in the area bounded on the north by the Negaunee, Maas and Cambria mines and on the southeast by the Mary Charlotte and Rolling Mill. There is scarcely a forty in this area which has either not shown ore or does not lie in such relation to discoveries as to indicate a strong probability of ore. The ore has been cut to a maximum depth of 2,375 feet.''

The soft ores lying in the middle or upper portion of this formation upon sills of greenstone were more easily accessible in earlier days and have been mined extensively for many years. The end of these deposits is, in many cases, measurably in sight.

A very large amount of the ore indicated by drilling is not at present available on account of certain complications of ownership. One company alone reports 40,000,000 tons in sight, of which only 23,000,000 tons are available. A very large additional tonnage was not reported at all. I do not believe that even half of the probable future tonnage of this district is even indicated by drilling. Nothing is known as to the probable downward extent of the ore. One is not indulging in optimism to expect this group of mines to produce 100,000,000 tons.

However, in most cases the amount of ore reported or indicated is enough to continue the life of the present mine for a sufficient period to cover approximately the whole present value of the district. As remarked above, a continuation of life beyond twenty years adds to the present value very slowly, and wherever the ore supply is sufficient to maintain output for even fifteen years, it is not worth while to be critical about the amount of additions that might be made.

LILLIE, CAMBRIA AND HARTFORD.

These properties are controlled at present by the Republic Iron & Steel Company. They report a total of approximately 900,000 tons of ore which is considered by Dr. Leith a sufficient amount. Probable extensions of the ore bodies of these mines occur on the neighboring Jackson mine.

JACKSON MINE.

The Jackson mine is owned by the Cleveland Cliffs Iron Company. This property is a section of land (640 acres) which has formerly produced large tonnages of hard ore in upper horizons. Soft ores will certainly be found on it to a certain extent, probably a very large extent, but the only place where ore is actually indicated is in some drill holes at the northwest corner of the property showing a continuation of the Lillie and Cambria ore bodies on the Jackson. The Lillie, Cambria and Hartford account for a total of 6,800,000 tons.

MARY CHARLOTTE MINE.

This ore body extends across the line of the adjacent Rolling Mill property and will produce 2,775,000 tons, sufficient to maintain a shipment of 200,000 tons a year for fourteen years.

BREITUNG-HEMATITE.

This property, making all allowance for some disputed ownerships can be credited with 2,000,000 tons of ore, sufficient to maintain a shipment of 100,000 tons a year for twenty years.

LAKE ANGELINE & MITCHELL.

The end of both these properties is in sight and tonnage credited to them is only 475,000 tons.

ROLLING MILL.

This property is good for 1,500,000 tons and a life of fifteen years.

LAKE MINE.

This property is bottomed and can only produce 3,700,000 tons more, which will probably be mined in ten years.

NEGAUNEE.

This property reports 13,635,000 tons available. This is sufficient to maintain a probable output of 500,000 tons a year for twenty-seven years.

SALISBURY.

This property is bottomed and contains 584,000 tons in sight. Its life is probably about seven years.

MAAS.

This property reports an available tonnage of 9,662,000 tons. This is sufficient to maintain an output of 400,000 tons a year for twenty-four years.

LAKE SUPERIOR SOFT ORE MINES.

It is difficult to distinguish tonnages reported for these properties from tonnages belonging to hard ore mines. In this connection only one property is listed, namely, Section 21. It is credited with 4,000,000 tons, sufficient to maintain an output of 200,000 tons annually for twenty years.

QUEEN.

This property reports about 1,900,000 tons which will probably last about ten years.

RACE COURSE.

This is a small tract owned by the Oliver Iron Mining Company. They estimate 1,500,000 tons on it, but at present it is not developed and will not be available for many years.

LUCKY STAR.

This property contains a continuation of the Queen ore body crossing its entire length of 1,500 feet. Four drill holes along the line of the ore show an average of 155 feet of ore between depths of 900 and 1,300 feet. Allowing a width of 300 feet for this ore body and an average thickness of 110 feet only, gives us more than 4,000,000 tons which is a very conservative estimate. This ore, however, is not developed for mining and will not be for a number of years.

HARVEY LOTS.

The continuation of the Lucky Star ore body is on the Harvey Lots. Drilling indicates 4,000,000 tons, but it is not developed and is not available on account of uncertainty of location of the ore body with reference to the boundaries. On account of these uncertainties, I value it on a very conservative basis.

VALUATIONS IN DISTRICT NO. 7.

These mines are considerably better developed and more established in the market than the Iron River district, consequently the values are higher. The tonnage put down as expected is somewhat greater. A large group of undeveloped properties are valued at twenty cents per ton in the ground at present. This is based on deducting expected cost of equipment of these properties for production and also deferring profits from them for a period of ten years.

The total value of the properties is $27,825,000, based on a yearly product of 2,263,000 tons and an expected tonnage of 53,145,651 tons.

DISTRICT NO. 8.—SWANZY, MARQUETTE COUNTY.

Dr. Leith describes this as an isolated canoe shaped basin of upper Huronian rocks, surrounded by granites south of the Marquette district. The axis of the basin is northwest southeast with minor cross folding. The dips are gentle except where cross-folded. The granite basement is irregular. The ore bodies are principally in the northeast side of the basin and at the ends. One ore body, the Stephenson, is known on the southwest side of the basin.

The ores are in tabular deposits with gentle dip. They have been thoroughly explored by drilling in advance of mining operations and the total tonnage of the basin is reasonably well approximated. The total shipments from this field have been 2,420,232 tons. The total available reserve indicated by mining and drilling operations is 6,851,475 tons.

All the mines of this district are controlled by the Cleveland Cliffs Company except the Stegmiller, a nearly exhausted property, controlled by the Oliver Iron Mining Company. The Cleveland Cliffs Company reports for its active mines the following tonnages of available ore:

Stephenson	780,646	tons.
Austin	503,774	tons.
Princeton No. 1	97,064	tons.
Princeton No. 2	1,060,253	tons.
Total	2,441,737	tons.

In addition it reports: Ores discovered by drilling only but not otherwise developed and to some extent of doubtful availability a total of 4,138,738 tons. I consider all of these estimates sufficient.

STEGMILLER.

This property reports 246,000 tons in sight. Dr. Leith adds 20,000 tons for probable ore making a total of 266,000 tons.

VALUATIONS OF DISTRICT NO. 8.

These mines are rather low grade, and are high in moisture. Many of the ore bodies discovered by drilling are of doubtful availability on account of underlying enormous masses of quicksand. While the Cleveland Cliffs Company is going ahead with the development and equipment of these mines, the conditions are such that they must be valued on a conservative basis.

The total valuations are $2,530,000 based on an expected yearly product of 456,000 tons, and a total expected output of 6,746,158 tons.

TABULATION NO. 9.

This covers various mines in different ranges which ship ore of much lower grade in iron contents than the ordinary merchantable ores of the Lake Superior region. Dr. Leith has the following to say in regard to them.

"The ores are but little higher in iron than the average of the adjacent iron formation. They are partly open cut and milling propositions and partly underground mines. Their mining at any particular locality depends upon favorable conditions, low phosphorus content or possession of a restricted market, or in the case of the Pewabic and other mines, a need of handling ore of this grade along with higher grades which are being hoisted. So far as we know, any of the mines which have produced this grade can produce it far in the future and estimates of tonnage would be of little consequence. For instance, in the Palmer area an estimate of tonnage of such ore would be enormous, but the limits are so indefinite that an estimate of tonnage is difficult."

"It should not be assumed that there are unlimited quantities of these ores. It is true that there is an enormous quantity with this percentage of metallic iron, but areas are comparatively limited where the phosphorus is exceptionally low and where the conditions allow of cheap mining. Therefore, these ore bodies have a distinct value because of their limitation."

However, the salient fact in connection with these ores is that their market is at present limited and, therefore, the value of the mines is on the whole more a question of certain commercial advantages than of simply an ore discovery.

VALUATIONS OF TABULATION NO. 9.

These mines are valued simply at the amount of their earnings during the past five years. No estimate is made for the probable tonnage that they can depend on. Total valuation is $373,000.

THE VALUE OF UNDEVELOPED IRON LANDS.

It was hoped up to the completion of our investigation that some means would be found of placing a value on unexplored iron ore formation. The final result, however, is a disappointment. Such lands are undoubtedly valuable, but we have not succeeded in finding any logical measure of their value.

The reason for this is that we have no means of knowing, without a very long investigation, what proportion of iron lands are really unexplored. If we could compare an area of fresh iron lands with another area that had been explored and had been proved to contain a certain tonnage of iron ore, we might then rationally assume that the undeveloped land would reduce somewhat in the same proportion, but it has been impossible to make any such comparison.

It must be borne in mind that the iron mines, as well as the copper mines, would lose value every year unless new ore is found to take the place of what is removed. It seems to me that it is a logical position to take in regard to undeveloped mineral lands, that whatever values they may be proved to contain will be appraised as soon as a mine is developed; in other words, the state loses nothing in the long run by not taxing such lands for their mineral value.

SUMMARY of costs, receipts, shipments and other data for the nine iron districts for five year period.

DISTRICT NO. 1

Gogebic County, Michigan

		Totals	Per ton
Number of mines and explorations reported		20	
Wages and salaries paid		$16,632,296 40	
General expenses (not including taxes)		$1,558,705 93	.098
Construction, development and explorations		4,083,864 20	.260
Mining expense		21,207,105 10	1.355
Total cost at mine		$26,849,675 23	1.72
Rail freights paid		6,002,288 37	.40
Lake freights paid		10,585,921 64	.71
Commissions paid		695,520 57	.046
Total expense		$44,133,405 81	*2.876 F.O.B. Cleveland
Total tons sold	15,183,842		
Total tons shipped	15,393,642		
Total tons mined	15,711,053		
Receipts from sale of ore		$65,694,536 07	
Total operating profit of 12 mines		21,944,683 57	
Taxes		992,272 42	
Proportion taxes to operating profits (per cent)		4.55	
Royalties		5,960,403 65	
Profit to companies (12 mines)		15,212,854 39	
Total profits 12 mines including royalties		20,957.419 53	
Total loss to three mines (exploration and development properties not included)		678,579 85	
Total tonnage reported in sight		17,354,100	
Tons added by appraiser		25,645,900	
Total tonnage expected		43,000,000	
Average yearly value (expected) per ton		$4 22	
Average cost per ton expected F. O. B. Cleveland		†2 87	
Average profit per ton expected		1 35	
Annual tonnage expected		2,875,000	
Present value of mines		$41,560,000 00	

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* The average cost per ton includes mines worked at a loss.

† The expected cost per ton is only for mines expected to work at a profit.

DISTRICT NO. 2

Iron County, Michigan

		Totals	Per ton
Number of mines and explorations reporting		29	
Wages and salaries paid		$4,411,151 48	
General expenses (not including taxes)		$352,688 31	.087
Construction, development and explorations		3,574,038 89	.895
Mining		5,211,894 90	1.30
Total cost at mine		$9,138,622 10	2.28
Rail freights paid		1,279,487 98	.40
Lake freights paid		1,609,055 90	.54
Commissions paid		260,351 01	.067
Total expense		$12,287,516 99	*$3.287 F.O.B. Cleveland
Total tons sold	3,848,325		
Total tons shipped	3,820,308		
Total tons mined	3,999,457		
Receipts from sale of ore		$12,740,286 82	
Total operating profit of 9 mines		2,044,106 72	
Taxes		103,907 11	
Proportion of taxes to operating profit (per cent)		5.5	
Royalties paid		844,038 89	
Profits to companies (7 mines)		1,395,354 01	
Total profits 9 mines (including royalties)		1,952,543 49	
Total loss to companies (10 mines)		1,912,320 91	
Total tonnage reported in sight		10,169,213	
Tonnage added by appraiser		31,952,787	
Total tonnage expected		42,122,000	
Average yearly value (expected) per ton		$3 23	
Average cost per ton expected, F.O.B. Cleveland		2 65	
Average profit per ton expected		58	
Annual tonnage expected		1,290,000	
Present value of mines		$17,042,000 00	

* Includes unprofitable mines.

DISTRICT NO. 3

	Totals	Per ton
Number of mines and explorations reporting	25	
Wages and salaries paid	$4,756,223 68	
General expenses (taxes not included)	$437,288 47	.064
Construction, development and explorations	1,789,786 65	.26
Mining	6,565,400 84	.956
Total cost at mine	$8,792,475 96	$1.28
Rail freights paid	2,374,293 64	.40
Lake freights paid	3,267,453 98	.57
Commissions paid	548,504 29	.09
Total expense	$14,982,727 87	$2.34 Includes unprofitable mines
Total tons sold 6,050,662		
Total tons shipped 6,119,177		
Total tons mined 6,777,255		
Receipts from sale of ore	$20,861,190 27	
Total operating profit (10 mines)	6,361,951 98	
Taxes	131,493 43	
Proportion of taxes to operating profits (per cent)	2.6	
Royalties paid	1,611,190 15	
Profits to companies (8 mines)	4,846,463 22	
Total profits (10 mines) including royalties	6,238,753 13	
Total loss to companies (6 mines) not including explorations	710,684 40	
Total tonnage reported in sight	1,233,900	
Tonnage added by appraiser	6,820,100	
Total tonnage expected	8,054,000	
Average yearly value (expected) per ton	3.52	
Average costs expected per ton F.O.B. Cleveland	2.36	
Average profit per ton expected	1.16	
Annual tonnage expected	880,000	
Present value of mines	$6,297,000 00	

DISTRICT NO. 4

		Totals	Per ton
Number of mines and explorations reporting		12	
Wages and salaries paid		$9,322,449 20	
General expense (not including taxes)		$971,447 21	.097
Construction, development and explorations		1,915,320 33	.192
Mining		11,289,470 33	1.128
Total cost at mine		$14,176,237 87	1.417
Rail freights paid		3,483,420 04	.40
Lake freights paid		5,369,237 62	.60
Commissions paid		66,661 27	.07
Total expense		$23,095,556 80	2.48 F.O.B. Cleveland
Tons sold	9,391,360		
Tons shipped	9,335,812		
Tons mined	10,052,564		
Receipts from sale of ore		$34,103,131 46	
Total operating profit of ten mines		11,040,230 75	
Taxes		795,696 22	
Proportion of taxes to operating profit (per cent)		7.24	
Royalties paid		2,395,619 41	
Profit to companies 9 mines		7,885,624 86	
Total profit--mines (including royalties)		10,249,066 96	
Total loss to companies, two		69,365 83	
Total tonnage reported in sight		9,177,348	
Tons added by appraiser		9,055,652	
Total tons expected		18,233,000	
Average yearly value (expected) per ton		$3.46	
Average cost per ton expected F.O.B. Cleveland		2.64	
Average profit per ton expected		.82	
Annual tonnage expected		1,540,000	
Present value of mines		$11,391,000 00	

DISTRICT NO. 5

Baraga County, Michigan

		Totals	Per ton
Number of mines and explorations reporting		3	
Wages and salaries paid		$565,969 48	
General expenses (not including taxes)		$48,919 32	.065
Construction, development and explorations		159,844 44	.214
Mining		951,722 56	1.28
Total cost at mine		$1,160.486 32	1.56
Rail freights paid		228,479 12	.35
Lake freights paid		398,492 21	.61
Commissions paid		40,147 35	.06
Total expense		$1,827,605 00	2.58
Tons sold	657,370		
Tons shipped	657,370		
Tons mined	744,603		
Receipts from sale of ore		$1,807,495 98	
Total operating profits, three mines		45,377 44	
Taxes		7,331 05	
Proportion of taxes to operating profit (per cent)		16.2	
Royalties paid		136,601 62	
Profits to companies--mines		None	
Total profits three mines (including royalties)		38,046 39	
Total loss to companies, three mines		98,555 23	
Tons reported in sight		1,864,185	
Tons added by appraiser		199,815	
Total tonnage expected		2,064,000	
Average yearly value (expected) per ton		$2.98	
Average cost per ton expected, F.O.B. Cleveland		2.61	
Average profit per ton expected		.37	
Annual tonnage expected		75,000	
Present value of mines		$335,000 00	

DISTRICT NO. 6

Marquette County, Michigan

		Total	Per ton
Number of mines and explorations reporting		11	
Wages and salaries paid		$5,296,704 30	
General expenses (taxes not included)		$582,605 38	.14
Construction, development and explorations		1,173,335 39	.29
Mining		6,801,080 83	1.67
Total cost at mine		$8,557,021 60	2.10
Rail freight paid		1,230,335 82	.40
Lake freight paid		2,359,387 30	.60
Commissions paid		59,900 93	.02
Total expense		$12,206,645 65	$3.12
Tons sold	3,873,785		
Tons shipped	3,888,557		
Tons mined	4,078,863		
Receipts from sale of ore		$17,015,407 56	
Total operating profit, 6 mines		5,246,934 10	
Taxes		495,505 01	
Proportion of taxes to operating profit (per cent)		9.45	
Royalties paid		262,329 14	
Profit to companies, 6 mines		4,723,752 76	
Total profits, 6 mines (including royalties)		4,866,081 90	
Total loss to companies, 2 mines		572,825 00	
Tons reported in sight		11,134,355	
Tons added by appraiser		10,532,645	
Total tonnage expected		21,667,000	
Average yearly value per ton expected		$4 30	
Average yearly cost per ton expected		3 32	
Average profits per ton expected		.98	
Annual tonnage expected		1,224,000	
Present value of mines		$12,132,000 00	

DISTRICT NO. 7

Marquette County, Michigan

		Totals	Per ton
Number of mines and explorations reporting		20	
Wages and salaries paid		$12,011,515 90	
General expenses (not including taxes)		$1,395,899 35	.12
Construction, development and explorations		2,140,866 05	.19
Mining		15,107,981 23	1.33
Total cost at mine		$18,644,746 63	1.64
Rail freight paid		3,064,947 71	.32
Lake freight paid		5,424,983 28	.65
Commissions paid		134,029 88	.01
Total expense		$27,268,707 50	$2.62
Tons sold	10,744,791		
Tons shipped	10,830,611		
Tons mined	11,354,811		
Receipts from sale of ore		$39,605,117 47	
Total operating profits, 15 mines		12,467,025 65	
Taxes		865,028 59	
Proportion taxes to operating profit, per cent		6.98	
Royalties paid		1,859,944 05	
Profit to companies, 13 mines		9,867,181 86	
Total profits, 14 mines (including royalties)		11,654,992 00	
Total loss to companies, 4 mines		255,584 53	
Tons reported in sight		35,961,538	
Tons added by appraiser		17,184,113	
Total tonnage expected		53,145,651	
Average yearly value per ton (expected)		$3.77	
Average yearly cost per ton (expected)		2.69	
Average profit per ton (expected)		1.08	
Annual tonnage expected		2,363,000	
Present value of mines		$27,825,000 00	

DISTRICT NO. 8

Marquette County, Michigan

		Totals	Per ton
Number of mines and explorations reporting		13	
Wages and salaries paid		$2,158,212 35	
General expense (not including taxes)		$172,674 60	.082
Construction, development and explorations		307,771 22	.148
Mining		3,312,786 07	1.580
Total cost at mine		$3,793,231 89	1.81
Rail freights paid		311,706 73	.32
Lake freights paid		418,475 85	.65
Commissions paid		....	....
Total expense		$4,523,414 47	2.78
Tons sold	1,669,737		
Tons shipped	1,670,263		
Tons mined	2,095,723		
Receipts from sale of ore		$5,682,757 47	
Total operating profit, 6 mines		1,267,967 36	
Taxes		99,687 11	
Proportion of taxes to operating profit (per cent)		7.9	
Royalties paid		540,348 62	
Profit to companies, 1 mine		1,047,803 59	
Total profit, 2 mines (including royalties)		1,219,975 79	
Total loss to companies, 3 mines		528,496 32	
Total tonnage expected		6,746,158	
Average yearly value per ton expected		$3.60	
Average cost per ton expected		2.94	
Average profit per ton expected		.66	
Annual tonnage expected		456,000	
Present value of mines		$2,530,000 00	

DISTRICT NO. 9

Various Scattered Low Grade Mines.

	Totals	Per ton
Number of mines and explorations reporting	11	
Wages and salaries paid	$620,145 06	
General expenses (taxes not included)	$59,960 53	.045
Construction, development and explorations	279,101 91	.22
Mining	845,056 92	.66
Total cost at mine	$1,184,119 36	.92
Rail freights paid	454,062 59	.40
Lake freights paid	502,930 70	.60
Commissions paid	72,834 61	.10
Total expense	$2,213,947 26	2.02
Tons sold 1,171,024		
Tons shipped 1,179,719		
Tons mined 1,293,658		
Receipts from sale of ore	$2,261,830 18	
Total operating profit, 4 mines	386,208 35	
Taxes	21,327 20	
Proportion taxes to operating profit (per cent)	5.45	
Royalties paid	154,427 35	
Profit to companies, 4 mines	278,364 85	
Total profit (including royalties)	374,323 47	
Total loss to companies, 5 mines	406,236 48	
Tons reported in sight	1,323,074	
Tons added by appraiser	None	
Total tonnage expected	1,323,074	
Average yearly value per ton expected	Valued only on past record	
Average cost per ton expected		
Average profit per ton expected		
Present value of mines	$373,000 00	
Annual tonnage expected	....	

Government Exhibit No. 416.

(March 19th, 1913.)

This AGREEMENT, made this First day of November Nineteen Hundred Five (1905) between CARNEGIE STEEL COMPANY, of Pittsburg, Pennsylvania, hereinafter called the SELLER, and STANDARD STEEL CAR COMPANY, of Pittsburg, Pennsylvania, hereinafter called the BUYER:

WITNESSETH, the Seller hereby agrees to furnish free on board cars at Buyer's Works all the steel plates, angles, I-beams, channels, bars and axles that shall be used for car construction during the period of ten (10) years, beginning NOVEMBER FIRST, NINETEEN HUNDRED FIVE (1905) and ending NOVEMBER FIRST, NINETEEN HUNDRED FIFTEEN (1915) in the works which Buyer now owns or controls (either by direct ownership or by ownership of stock), or which Buyer now leases or operates, or which Buyer may during the life of this contract own or control (either by direct ownership or by ownership of stock), or which Buyer may lease or operate; and the Buyer agrees to take and pay for said material in accordance with the prices, terms, and conditions hereinafter stated.

All prices for material furnished under this contract shall include delivery free on board cars at Buyer's Works and shall be based on the average quarterly price, free on board cars at Pittsburg, Pennsylvania, of Standard Bessemer Pig Iron. These prices shall be ascertained by adding to such average quarterly price of Pig Iron the extras set forth in the tables immediately following and the through tariff rates of freight from Pittsburg to Buyer's Works, except that on shipments from Seller's Works at Homestead, Pennsylvania, to Buyer's Works at Butler, Pennsylvania, via the Bessemer & Lake Erie Railroad, the rate of freight to be added shall be one and one-half cents (1-½c.) per one hundred (100) pounds:

TABLE OF EXTRAS FOR STEEL PLATES, I-BEAMS, CHANNELS & STANDARD ANGLES.

When the Average Quarterly Price of Standard Bessemer Pig Iron per gross ton is:	The Extra to be added per gross ton for plates ¼″ thick and thicker, over 6″ in width, and for I-beams and channels 15″ and under, is:
Under $8.50 and $8.50 to $8.99	$15.90
9.00 to 9.49	16.04
9.50 to 9.99	16.18
10.00 to 10.49	16.32
10.50 to 10.99	16.46
11.00 to 11.49	16.60
11.50 to 11.99	16.74
12.00 to 12.49	16.88
12.50 to 12.99	17.02
13.00 to 13.49	17.16
13.50 to 13.99	17.30
14.00 to 14.49	17.44
14.50 to 14.99	17.58
15.00 to 15.49	17.72
15.50 to 15.99	17.86
16.00 and over at the same ratio.	

For Standard Angles, $1.00 per gross ton less than the price of plates ¼″ thick, over 6″ in width.

For 3/16″ plates, $1.00 per gross ton advance over price of plates ¼″ thick and over 6″ in width.

For ⅛″ plates and for Standard angles of a less weight than one pound per lineal foot, and for 18″, 20″ and 24″ beams, $2.00 per gross ton advance over the price of plates ¼″ thick, over 6″ in width.

TABLE OF EXTRAS FOR STEEL BARS.

When the Average Quarterly Price of Standard Bessemer Pig Iron per gross ton is:	The Extra to be added per gross ton for bars, base sizes of Standard Steel Card of March 17th, 1904, is:
Under $10.00 and $10.00 to $10.49	$12.40
10.50 to 10.99	12.54

11.00 to 11.49	12.68
11.50 to 11.99	12.82
12.00 to 12.49	12.96
12.50 to 12.99	13.10
13.00 to 13.49	13.24
13.50 to 13.99	13.38
14.00 to 14.49	13.52
14.50 to 14.99	13.66
15.00 to 15.49	13.80
15.50 to 15.99	13.94
16.00 to 16.49	14.08
16.50 to 16.99	14.22
17.00 to 17.49	14.36
17.50 to 17.99	14.50
18.00 to 18.49	14.64

18.50 and over at the same ratio.

For sizes other than base sizes of Standard Steel Card of March 17th, 1904, shall be added half the extras of said card in addition to the above.

TABLE OF EXTRAS FOR STEEL CAR AXLES.

When the Average Quarterly Price of Standard Bessemer Pig Iron per gross ton is:	The extra to be added per gross ton for freight car axles to Carnegie Standard Specifications of April 1st, 1905, or their equivalent, of standard dimensions and weight not exceeding 599 lbs., nor less than 450 lbs. each, smooth forged, is:
Under $8.50 and $8.50 to $8.99	$18.70
9.00 to 9.49	18.84
9.50 to 9.99	18.98
10.00 to 10.49	19.12
10.50 to 10.99	19.26
11.00 to 11.49	19.40
11.50 to 11.99	19.54
12.00 to 12.49	19.68
12.50 to 12.99	19.82
13.00 to 13.49	19.96

13.50 to 13.99	20.10
14.00 to 14.49	20.24
14.50 to 14.99	20.38
15.00 to 15.49	20.52
15.50 to 15.99	20.66

16.00 and over at the same ratio.

For rough-turning journals and wheel-seats	$1.25	per gross ton additional.
For rough-turning all over	2.50	" " " "
For axles weighing 600 lbs. and heavier	2.00	" " " "
For axles to Chemical Requirements equivalent to P. R. R. Specifications dated September 22nd, 1899	5.50	" " " "

For Passenger Car axles, a special extra of $1.00 per gross ton additional to *all* above.

Upon the foregoing conditions, it is further mutually agreed between the parties hereto as follows:

First: The prices contemplated by this contract for above materials shall be fixed for each Calendar Quarter and shall be determined according to the above tables from the Average market price of Standard Bessemer Pig Iron, free on board cars at Pittsburg, for the next preceding Quarter; the average market price of Pig Iron for each month to be first ascertained, and from these monthly prices, the average price for the Quarter computed. The average monthly price shall be agreed upon in writing within one week from the end of each month, and the average price for the Quarter shall be agreed upon in writing within one week from the end of the third month. In case the parties hereto cannot mutually agree upon the average price of Pig Iron, and reduce said agreement to writing, within said time, it shall be referred to Albert H. Childs, as arbitrator. Written notice to him by either party of its failure to agree upon said prices within said times shall be all that is necessary to invoke his power hereunder, and the decision of Albert H. Childs as to the price or prices shall be final and conclusive upon both parties.

It is also mutually agreed that any other differences arising under this contract, whether in respect to its interpretation, its manner of execution, or any rights of either party thereunder, shall also be referred to Albert H. Childs, whose decision shall be final and binding upon both parties. In case of the inability of said Albert H. Childs to act as arbitrator, each of the parties to this agreement shall select a person of experience in the iron and steel trade as arbitrator. In case of their failure to agree, the two persons thus nominated shall select a third person, whose decision shall be final and binding upon both parties.

SECOND: Settlements shall be made by the Buyer in cash on or before the twentieth of each month for shipments of the preceding calendar month.

THIRD: The Buyer shall advise Seller promptly in writing of each bid made by it for any construction into which above material may enter, by number, or the name of the prospective purchaser, and the approximate tonnages and character of material covered by such bid. The Buyer shall also advise Seller in writing immediately on receipt of notice of acceptance of such bids. The prices fixed by this contract as of the date written notice of such bid is received by Seller shall govern the sale of such material.

The Buyer shall place orders for such material in detail with Seller as promptly as they can be written up after the sales are closed by Buyer, specifying the month or months for delivery, and shipment shall be made in consecutive order in accordance with such specifications. Should unreasonable delays occur on the part of the Seller in making deliveries, the privilege is extended to the Buyer of cancelling the unshipped portions of such delayed orders.

FOURTH: Notwithstanding any other provision of this contract, when the average price of Standard Bessemer Pig Iron for any one quarter falls below $12.50 per gross ton, free on board cars at Pittsburg, Pennsylvania, the total quantity of all classes of material covered by this contract that the Buyer may require the Seller to deliver at such Quarter's prices shall not be more than that required for the construction of Seven Thousand Five Hundred (7,500) all steel cars.

When the average quarterly price of standard Bessemer Pig Iron per gross ton is:	The price of Plates, Shapes 15" and under, and Soft Steel Bars, f.o.b. cars, Pittsburg, Pa., will be:		
	Per gross ton	Per net ton	Per pound
$10.00 and under..................	$22.56	$20.14	1.01¢
Over $10.00 to and including $11.00	23.84	21.28	1.06¢
" $11.00 " " " 12.00	25.12	22.42	1.12¢
" $12.00 " " " 13.00	26.40	23.56	1.18¢
" $13.00 " " " 14.00	27.68	24.70	1.24¢
" $14.00 " " " 15.00	28.96	25.84	1.29¢
" 15.00 " " " 16.00	30.24	26.98	1.35¢
" 16.00 " " " 17.00	31.52	28.12	1.41¢
" 17.00 " " " 18.00	32.80	29.26	1.46¢
" 18.00 " " " 19.00	34.08	30.40	1.52¢
" 19.00 " " " 20.00	35.36	31.54	1.58¢
" 20.00 " " " 21.00	36.64	32.68	1.64¢
" 21.00 " " " 22.00	37.92	33.82	1.69¢
" 22.00 " " " 23.00	39.20	34.96	1.75¢
" 23.00 " " " 24.00	40.48	36.10	1.81¢
" 24.00 " " "	40.48	36.10	1.81¢

For Beams over 15" - $2.00 per net ton advance. For Bars other than base sizes of Standard Steel Card dated March 17, 1904, shall be added half extras of said card. (Except Quantity Diff) per J C N 2/23/06. (Note. The words underlined are written in pencil in original.)

Notwithstanding any other provision of this contract, the total quantity of all classes of material that Seller shall be required to deliver in any one month shall not be more than that required for the construction of Two Thousand Five Hundred (2,500) all steel cars.

In case the Buyer requires for the operations of its works more than the above maximum quantity of all classes of material at any one Quarter's prices, or more than the above maximum quantity of all classes of material for any one month, the Seller is hereby given the option of furnishing such excess at the prices and upon the terms and conditions of this contract.

Fifth: Strikes, differences with workmen, or other contingencies beyond control of the respective parties hereto, shall be sufficient excuse to either party for failure to make or accept deliveries under this contract during the continuance of such contingency: But, upon its removal, this contract shall be resumed without any extension by reason of such suspension.

Sixth: It is a condition of this contract that the Buyer shall not re-sell any of the material furnished hereunder, without first putting it through a process of manufacture.

Seventh: It is further agreed that the Buyer is to notify the Seller from time to time of any contemplated increase in its plant, which would involve larger demand for material from the Seller.

Eighth: Notwithstanding any other provisions of this agreement, it is mutually understood and agreed between the parties hereto that at no time shall the prices charged for material delivered at Buyer's Works exceed the market prices for similar deliveries which are current at the time the Buyer submits bids to the Seller as provided in clause three.

Ninth: All of the provisions of this contract shall apply to the successors, or assigns succeeding to the business of each of the parties hereto.

This contract may be terminated at any time after two (2) years from November First, Nineteen Hundred Five (1905) by either party giving one year's notice in writing.

TENTH: The Seller is hereby given the right to have any Company in which the United States Steel Corporation is interested as stockholder, or otherwise, furnish material of the same kind and quality, at the same cost to the Buyer in whole or part performance of this contract, and it is agreed that shipments and billing of material by or in the name of such Company, as well as any payments made to such Company therefor, shall be as effective and binding as if made by or to the Carnegie Steel Company direct.

EXECUTED AND DELIVERED at the City of Pittsburg, Pennsylvania, the day and year first above written.

STANDARD STEEL CAR CO.	CARNEGIE STEEL COMPANY
J. M. HANSEN	H. P. BOPE,
President	1st Vice President.

Government Exhibit No. 417.

(March 19, 1913.)

This AGREEMENT, made this fifteenth day of July, nineteen hundred five, (1905), between CARNEGIE STEEL COMPANY, of Pittsburg, Pennsylvania, and ILLINOIS STEEL COMPANY, of Chicago, Illinois, hereinafter called the SELLER, and AMERICAN STEEL FOUNDRIES, hereinafter called the BUYER:

WITNESSETH: The Seller hereby agrees to furnish, free on board cars, at Hammond, or at destinations hereinafter determined, all the steel plates, angles, I-beams, channels and ordinary steel bars that may be required by the Buyer for the manufacture of Bolsters and Brake Beams, not to exceed One Hundred Thousand (100,000), tons per year, except as hereinafter provided, during the period of Ten (10) years, beginning July 15th, 1905, and ending July 15th, 1915, in the works within the United States which Buyer now leases or operates within the United States, or which Buyer may during the life of this Agreement own or control (either by direct ownership or by ownership of stock), or which Buyer may lease or operate within the United States; and the Buyer agrees to take and pay for said materials in accordance with the prices, terms and conditions hereinafter stated.

All materials to be furnished under this Agreement shall be of such sizes as Seller rolls and of standard merchantable grade, and shall conform in workmanship to Seller's standard mill practice.

All prices for materials furnished under this agreement shall include delivery free on board cars at Hammond, Indiana, or F.o.b. cars destination hereafter determined, free of any switching expenses by railroads owned or controlled by consignees, and for all materials of Carnegie Steel Company's manufacture shall be the prices set forth in the following table, plus the through tariff rates of freight from Pittsburg to various destinations; for all materials of Illinois Steel Company's manufacture shipped to Hammond, Indiana, the prices shall be those set forth in the following table, plus eight and one-quarter (8-¼) cents per hundred pounds.

Should the Buyer during the period covered by this Agreement begin the manufacture of Bolsters and Brake Beams at points other than Hammond, Indiana, prices of all materials of Illinois Steel Company's manufacture shall be those set forth in the following table plus eight and one-quarter (8-¼) cents per hundred pounds, plus the through tariff rate of freight from Chicago to such points, it being understood and agreed, however, that Buyer is privileged to have materials furnished by the Carnegie Steel Company, if freight rates from their works to certain destinations are lower than from the works of the Illinois Steel Company.

Upon the foregoing conditions, it is further mutually agreed between the parties hereto, as follows:

FIRST: The prices contemplated by this agreement for above materials shall be fixed for each calendar quarter and shall be determined according to the above table from the average market price of Standard Bessemer Pig Iron, free on board cars at Pittsburg, Pa., for the next preceding quarter; the average price of Pig Iron for each month to be first ascertained, and from these monthly prices, the average price for the quarter computed. The average monthly price shall be agreed upon in writing within one week from the end of each month; and the average price for the quarter shall be agreed upon in writing within one week from the end of the third month. In case the parties hereto can not mutually agree upon the average price of Pig Iron and reduce said agreement to writing, within said time, it shall be referred to Albert H. Childs, as arbitrator. Written notice to him by either party of its failure to agree upon said prices within said times shall be all that is necessary to invoke his power hereunder; and the decision of Albert H. Childs as to the price or prices shall be final and conclusive upon both parties.

It is also mutually agreed that any other differences arising under this agreement, whether in respect to its interpretation, its manner of execution, or any rights of either party thereunder, shall also be referred to Albert H. Childs whose decision shall be final and binding upon both parties. In case of the inability or refusal of said Albert H. Childs to act as arbitrator, each of the parties to this agreement shall select a person of experience in the iron and steel trade as arbitrator. In case of their failure to agree, the two persons thus nominated shall select a third person, whose decision shall be final and binding upon both parties.

SECOND: Notwithstanding any previous provisions of this agreement, it is mutually understood and agreed between the parties hereto that at no time shall the prices charged for materials delivered at Buyer's various works exceed the market prices for similar deliveries which are current at the time the Buyer submits bids to the Seller as provided in clause four.

THIRD: Settlements shall be made by the Buyer in cash on or before the twentieth of each month for shipments of the preceding calendar month.

FOURTH: The Buyer shall advise Seller promptly in writing of each bid made by it for any construction into which above materials may enter, by number, the name of the prospective purchaser, and the approximate tonnages and character of materials covered by such bid. The Buyer shall also advise seller in writing immediately upon receipt of notice of acceptance of such bids. The prices fixed by this agreement as of the date written notice of such bid is received by Seller shall govern the sale of such materials.

The Buyer shall place orders for such materials in detail with Seller as promptly as they can be written up after the sales are closed by Buyer, specifying the month or months for delivery, and shipment shall be made in consecutive order in accordance with such specifications.

FIFTH: Notwithstanding any other provision of this agreement, when the average price of standard Bessemer Pig Iron for any one quarter falls below $12.50 per gross ton, free on board cars at Pittsburg, Pa., the total quantity of all classes of materials covered by this agreement that the Buyer may require the Seller to deliver at such quarter's prices shall not be more than 25,000 tons.

Notwithstanding any other provision of this agreement, the total quantity of all classes of materials that Seller shall be required to deliver in any one month shall not be more than 12,500 tons.

In case the Buyer requires for the operations of its works more than the above maximum quantity of all classes of materials at any one quarter's prices, or more than the above maximum quantity of all classes of materials for any one month, or more than 100,000 tons for any one year, the Seller is hereby given the option of furnishing such excess at the prices and upon the terms and conditions of this agreement.

SIXTH: Strikes, differences with workmen, or other contingencies beyond the control of the respective parties hereto, shall be sufficient excuse to either party for failure to make or accept deliveries under this agreement during the continuance of such contingency, but upon its removal this agreement shall be resumed without any extension of time or tonnage by reason of such suspension.

SEVENTH: It is a condition of this agreement that the Buyer shall not re-sell any of the material furnished hereunder, without first putting it through a process of manufacture.

EIGHTH: It is further agreed that the Buyer is to notify the Seller from time to time of any contemplated increase in its plant or plants, which would involve larger demand for material from the Seller.

NINTH: All of the provisions of this agreement shall apply to the successors, or assigns, succeeding to the business of each of the parties hereto.

TENTH: The Seller is hereby given the right to have any Company in which the United States Steel Corporation is interested as stockholder, or otherwise, furnish materials of the same kind and quality, at the same cost to the Buyer, in whole or part performance of this agreement; and it is agreed that shipments and billing of material by or in the name of such Company, as well as any payments made to such Company therefor, shall be as effective and binding as if made by or to the Carnegie Steel Company or the Illinois Steel Company direct.

ELEVENTH: Either party hereto has the privilege of cancelling this agreement on one year's written notice. Such notice, however, not to be given prior to July 15th, 1909, but may be made any time after this.

TWELFTH: Notwithstanding any other provisions of this agreement, the Seller shall not be under obligations to accept, but shall have the option to accept, orders offered to it in the manner above provided which call for deliveries at a time more than six months after the receipt of such order, and shall not be under obligations to accept, but shall have the option to accept, in any quarter any orders offered to it in the manner above provided which are in excess of 50,000 tons.

THIRTEENTH: And, notwithstanding any other provisions of this Agreement, it is understood and agreed that the Seller shall have the privilege at all times of designating the mill from which deliveries are to be made.

EXECUTED AND DELIVERED at the City of Pittsburg, Pennsylvania, the day and year first above written.

CARNEGIE STEEL COMPANY
(Signed) H. P. Bope
First Vice President.

Accepted:
AMERICAN STEEL FOUNDRIES
(Signed) WM. V. KELLY
Pres.

ILLINOIS STEEL COMPANY
(Signed) E. J. Buffington
Pres.

Copy

Government Exhibit No. 418.

(March 19th, 1913.)

AGREEMENT

MADE this 30th day of June, 1909, between CARNEGIE STEEL COMPANY, hereinafter called "Carnegie," party of the first part, and OLIVER IRON & STEEL COMPANY, hereinafter called "Oliver," party of the second part.

WHEREAS, Carnegie manufactures Steel Billets of certain sizes, weights and chemistry and Oliver has for sale large quantities of Standard Connellsville Furnace Coke and produces large quantities of Steel Scrap, AND

WHEREAS, Oliver desires to obtain an adequate supply of Steel Billets for use in the operation of its Works, for a period of five (5) years following the first day of July, 1909, and Carnegie desires to purchase Coke and Steel Scrap from Oliver during said period,

NOW, THEREFORE, IN CONSIDERATION OF THE MUTUAL COVENANTS HEREINAFTER CONTAINED AND OF THE SUM OF ONE ($1.00) DOLLAR, lawful money of the United States of America, paid by each of the parties hereto to the other party, the receipt whereof is hereby acknowledged, it is mutually agreed by and between Carnegie and Oliver as follows:—

STEEL BILLETS.

Carnegie hereby sells and Oliver buys, all the Open Hearth and Bessemer Steel Billets of the sizes, weights and chemistry manufactured by Carnegie, which shall be required in the operation of Oliver's Works for a period of five (5) years following the first day of July, 1909; the quantity to be not less than three thousand (3,000) gross tons and not more than eight thousand (8,000) gross tons per calendar month; and in case the maximum tonnage herein above specified shall not be sufficient for Oliver's requirements, Carnegie shall have the option of furnishing such excess tonnage as may be required in accordance with the terms and provisions of this agreement.

Not more than forty per cent (40%) of any one month's tonnage shall be of Bessemer Steel.

Except as herein otherwise specifically excepted, Oliver hereby sells and Carnegie buys, a sufficient quantity of Standard Connellsville Furnace Coke, burned hard, suitable for the manufacture of Bessemer Iron, loaded in clean cars, free from ashes and other foreign substances on the basis of eleven (11) net tons of Coke F. O. B. cars ovens for one (1) gross ton of Billets at the base price, to pay for all Billets delivered hereunder. The total tonnage of Coke delivered during any one month to be sufficient to pay for the total tonnage of Billets specified to be delivered during such month. All differences to be settled in cash as hereinafter provided.

IT IS UNDERSTOOD that Oliver shall ship the entire output of the Oliver Works, Nos. 1, 2 and 3 near Uniontown, Fayette County, Pennsylvania, aggregating eleven hundred and eight (1108) ovens to Carnegie each month, if necessary to pay for the Billets specified to be delivered hereunder during such month.

If Oliver shall produce more Coke than is required to pay for the Billets specified for delivery in any one month, Carnegie shall have the option of purchasing such Coke; and in such case Oliver shall notify Carnegie of such fact at the time of giving the sixty (60) days written notice of the approximate number of tons of each grade of Billets required for such month; and Carnegie shall have ten (10) days after receipt of such notice in which to exercise or reject said option. The price to be paid by Carnegie to Oliver for such excess Coke shall be determined in accordance with the provisions of this contract, except that such price shall not in any event be less than one and seventy one-hundredths Dollars ($1.70) per net ton.

SCRAP.

Oliver also sells and Carnegie buys, all the Steel Scrap, except turnings and chippings produced by Oliver in the operation of its Works. Said scrap to be delivered promptly in carload lots as the same is produced.

PRICE OF BILLETS.

The base price of all Billets delivered hereunder shall be fixed monthly, on or before the eighth day of each month for each one month's period beginning July 1st, 1909; and shall be based upon the average selling price of Standard Bessemer Pig Iron F. O. B. cars Pittsburgh, during the next preceding month and shall be determined in accordance with the following schedule:

WHEN THE SAID AVERAGE SELLING PRICE OF PIG IRON PER GROSS TON IS	AMOUNT TO BE ADDED PER GROSS TON TO FIX THE BASE PRICE OF BILLETS
$ 8.00 to $ 8.99	$ 4.50
9.00 " 9.99	4.75
10.00 " 10.99	5.00
11.00 " 11.99	5.25
12.00 " 12.99	5.50
13.00 " 13.99	5.75
14.00 " 14.99	6.00
15.00 " 15.99	6.25
16.00 " 16.99	6.50

$17.00 and over at the same ratio.

The base price shall apply to Soft Open Hearth and Bessemer Billets up to and including .25 carbon, size 4″ x 4″ and up to but not including 10″ x 10″ and larger, in lengths not less than 24″ and in cuts not less than one hundred (100) lbs. each.

For Billets of the above stated dimensions above .25 carbon and not more than .60 carbon, the price per gross ton shall be One ($1.00) Dollar greater than the base price; and for such Billets above .60 carbon, the price per gross ton shall be Two ($2.00) greater than the base price.

IT IS UNDERSTOOD that Oliver shall be permitted to make only a limited tonnage of such high carbon Billets as are manufactured by Carnegie.

For Billets smaller than 4″ x 4″ in lengths of about thirty (30) feet, the price shall be One ($1.00) Dollar per gross ton greater than the price of 4″ x 4″ or larger Billets of similar chemistry.

In case any orders for Billets remain unshipped at the end of the month, such Billets shall be delivered during the next succeeding month or months at the ruling price for the month in which such Billets were specified for delivery.

PRICES OF COKE.

The price of each net ton of coke delivered under this contract shall be one-eleventh (1/11) of the average price of all Billets actually shipped by Carnegie during the month in which such Coke is shipped.

PRICES OF SCRAP.

The price of each gross ton of Scrap delivered hereunder shall be five per cent (5%) less than the average of the Standard Bessemer Pig Iron prices used in determining the prices of Billets shipped to Oliver under this contract during the month in which such Steel Scrap is shipped.

METHOD OF DETERMINING AVERAGE. SELLING PRICE OF PIG IRON.

The average selling price of Standard Bessmer Pig Iron for any one month shall be determined by taking sales made by the Furnaces during the next preceding month, on a basis of delivery F. O. B. cars Pittsburgh as reported by W. P. Snyder & Company. Multiply the tonnage covered by each sale by the price per ton of such sale and divide the total of the amounts thus obtained by the number of tons sold. In case W. P. Snyder & Company shall fail to report such Pig Iron Sales, such information shall be obtained in such manner as may be mutually agreed upon by the parties hereto.

METHOD OF DETERMINING AVERAGE BASE PRICE OF BILLETS.

The average base price of Billets for any one month shall be determined as follows: Separate the tonnage of Billets actually shipped during said month according to the base prices at which they are charged. Multiply each separate tonnage by its respective base price and divide the total amount thus obtained by the total number of tons shipped. For example: Let us assume that in November shipment of Billets against the various months' specifications is made as follows:—

September	1000	tons
October	2000	"
November	3000	"
December	1000	"

and that the base prices for these months are $22.00; $22.24; $22.50 and $22.75 respectively. The average base price charged for shipments in November would be $22.39.

METHOD OF DETERMINING PRICES OF SCRAP.

The average of Standard Bessemer Pig Iron prices used in determining the price of Billets actually shipped during any one month shall be determined as follows:—

Separate the tonnage of Billets actually shipped during said month according to the base prices at which they are charged; then deduct the "Spread," (which is the amount added to the gross ton price of Pig Iron to obtain the base price per gross ton of Billets). Multiply each separate tonnage by its respective Pig Iron price and divide the total amount thus obtained by the total number of tons shipped. For example:— Let us assume that in November shipment of

Billets against the various months' specifications is made as follows:

September	1000 tons
October	2000 "
November	3000 "
December	1000 "

and that the base prices fixed for these months are $22.00; $22.24; $22.50 and $22.75 respectively. The prices of Pig Iron used in determining the prices of Billets would be $15.75; $15.99; $16.00 and $16.25. The average of these Pig Iron prices would be $16.00.

SPECIFICATIONS.

Oliver shall give to Carnegie written specifications, (which shall in all cases be Standard Specifications for Carnegie Steel Billets), for all billets, not later than the tenth day of the month in which shipment is required, and shall also give written notice of the approximate number of tons of Bessemer and Open Hearth Billets required in any month, at least sixty (60) days before the first day of said month; For example: For billets required in October Oliver shall give written notice of the approximate number of tons and grade together with the deliveries required on or before the first day of August; and Carnegie shall make the deliveries as requested as near as circumstances and mill conditions will permit. If Carnegie is unable to deliver the total tonnage of Billets specified for delivery during any one month, the orders unfilled at the end of the month shall be delivered durring the next succeeding month or months at the prices ruling for the month in which such Billets were specified for delivery.

In case Carnegie shall fail to ship any Billets ordered by Oliver, hereunder, within thirty (30) days after the last day of the month in which such Billets are specified for delivery, Oliver may give written notice, to Carnegie, of a desire to cancel the orders for such tonnage, and if such Billets are not shipped by Carnegie within Fifteen (15) days after receipt of such notice, such orders shall be cancelled forthwith. This provision shall not apply to any orders for Billets upon which shipment has been suspended at the request of Oliver.

It is understood that in case of emergency orders for special sizes or special carbon Billets, Carnegie will accept specifications for delivery in less than twenty (20) days; and will make a special effort to deliver material so ordered as promptly as mill conditions will permit.

Analysis of Coke.

Oliver shall mine their coal in such manner or make such analysis of the Coke, as to enable them to separate all such Coke into two (2) different grades to be known as "High Phosphorus" and "Low Phosphorus" Coke respectively. All Coke exceeding .020 phosphorus shall be known as "High Phosphorus" Coke; and all Coke not exceeding .020 phosphorus shall be known as "Low Phosphorus" Coke.

Oliver shall ship each grade of Coke separately in carload lots and shall attach to each car a card marked "High Phosphorus" or "Low Phosphorus" as the case may be.

Points of Delivery.

All Billets shall be delivered F. O. B. cars Oliver's Works, Pittsburgh, Pennsylvania. All Standard Connellsville Furnace Coke shall be delivered F. O. B. cars Oliver's Works near Uniontown, Pennsylvania. All Steel Scrap shall be delivered F. O. B. cars Homestead Steel Works, except that Carnegie shall have the right to order said Scrap delivered elsewhere; and in such case, Oliver shall allow the freight rate to Homestead Steel Works.

It is understood and agreed that the H. C. Frick Coke Company will, as the agent for Carnegie give shipping directions and destinations to Oliver for all said Coke, not later than the day preceding shipment; but the privilege is reserved to the said H. C. Frick Coke Company to change destination from time to time as may be considered necessary and convenient.

SETTLEMENTS.

Carnegie will charge Oliver and Oliver will credit Carnegie with the tonnage of Billets shipped by Carnegie or other Companies hereinafter named, each calendar month; and Oliver will charge Carnegie and Carnegie will credit Oliver with the tonnage of Coke and the tonnage of Scrap shipped during the same month; and any differences shall be paid in cash on the 20th day of the month next succeeding that in which such shipments are made.

BILLETS SHIPPED BY COMPANIES OTHER THAN CARNEGIE.

Carnegie is hereby given the right to have any Company in which the United States Steel Corporation is intersted as stockholder or otherwise, furnish material of the same kind and quality at the same cost to Oliver in whole or in part performance of this contract; and it is agreed that shipments of material by or in the name of such companies shall be as effective and binding as if made by Carnegie direct.

STRIKE CLAUSE.

Strikes, differences with workmen, accidents, shortage of cars, inability of railroads to transport, or other contingencies beyond the control of the respective parties hereto, shall be sufficient excuse for failure to make or accept deliveries or for delays in deliveries under this contract during the continuance of such contingency; and upon its removal, this contract shall be resumed without any change in the date of expiration by reason of such suspension.

BILLETS TO BE PUT THROUGH PROCESS OF MANUFACTURE.

The Billets are sold by Carnegie at the prices herein named upon condition that Oliver shall not re-sell any of the Billets delivered hereunder without first putting them through a process of manufacture at its Works; and any failure on the part of Oliver to comply with said condition, shall, at the option of Carnegie, be sufficient cause for an immediate cancellation or termination of this contract.

ARBITRATION.

Should any dispute arise between the parties to this agreement as to the average price of Pig Iron, or concerning the obligations or rights of either of them, the same shall be referred to a Board of Arbitrators to consist of three (3) members to be chosen as follows, viz: Oliver shall select one arbitrator and Carnegie shall select one arbitrator. The two arbitrators so chosen shall select the third.

If either Oliver or Carnegie shall fail to appoint their arbitrator within ten (10) days after the party desiring arbitration has appointed its arbitrator and given notice to the other of such appointment and of the matter proposed to be arbitrated, then the arbitrator so appointed shall appoint for the defaulting party and both arbitrators shall appoint the third as above provided; and said Board so appointed shall hear and decide the dispute. The decision of said arbitrators, or that of the majority of them, shall be final and conclusive between the parties upon all matters concerning which said arbitration is demanded.

TERM.

THIS AGREEMENT shall take effect on the first day of July 1909 and thereafter continue in full force and effect during and until the 30th day of June 1914.

IT IS MUTUALLY COVENANTED AND AGREED that this agreement and all its terms and provisions shall inure to the benefit of and be binding upon the parties hereto, their respective successors and assigns.

IN WITNESS WHEREOF. the respective parties hereto have duly executed this agreement, the day and year first above written.

ATTEST:

....
Secretary.

CARNEGIE STEEL COMPANY,
By......................
President.

ATTEST:

....

Secretary.

OLIVER IRON & STEEL COMPANY,
By..........................
President.

Government Exhibit No. 419,

(March 19, 1913.)

CARNEGIE STEEL COMPANY.

Eastern Office: 71, Broadway.
New York.

Copy of Letter.

FEBRUARY 18TH, 1904.

(Rubber Stamp)

American Locomotive Company

Received
Feb 19 1904
Answered

General Purchasing Agent.

H. C. Hequembourg, Esq.
General Purchasing Agent,
American Locomotive Company,
Schenectady, N. Y.

DEAR SIR:

We hereby propose to furnish you with OPEN HEARTH FORGING STEEL BILLETS, upon the following terms and conditions, viz.:

Quantity

The tonnage for rods (not including axles) not to exceed

Twenty-seven hundred (2700) Gross tons; the tonnage for axles not to exceed Thirty-seven hundred and fifty (3750) Gross tons; and in each case not to be less than Seventy-Five Per Cent. (75%) of your total unspecified requirements up to January 1st, 1905, excepting such portion thereof as you have already otherwise contracted for or have in stock.

Quality

Billets to be of quality to comply with your Specifications No. 9-B, dated June 1st, 1903.

Deliveries

Deliveries to be made as promptly after receipt of specifications as conditions of our mills will permit, subject to delays from strikes, accidents or other causes unavoidable or beyond our control.

Prices

(In carload lots.)

Sizes as heretofore furnished, not less than 16 square inches in area, and up to and including .25 in carbon.

f. o. b. cars buyers' works, Manchester, N. H. and Providence, R. I. $25.25 per gross ton, base,

f. o. b. cars buyers' works, Paterson, N. J. and Schenectady, N. Y. and Richmond, Va. $24.75 per gross ton, base,

f. o. b. cars buyers' works, Dunkirk, N. Y.—
$23.75 per gross ton, base,

f. o. b. cars buyers' works, Scranton, Pa.—
$24.25 per gross ton, base,

f. o. b. cars buyers' works, Allegheny, Pa.—
$23.00 per gross ton, base.

The above prices are subject to the following extras:

$1.00 per gross ton for carbon .26 to .60
$2.00 per gross ton for carbon over .60

Terms, net cash 30 days from date of invoice.

Your acceptance of this proposal, with return of one copy, will constitute contract between us.

Yours very truly,
CARNEGIE STEEL COMPANY,
Chas. W. Baker,
Manager of Sales.

ACCEPTED:
American Loco Co.
By H. C. Hequembourg
G. P. A.

Government Exhibit No. 420.

(March 19, 1913.)

November 15th, 1904.

No. 9 S-B-L-

CONTRACT covering sale of Basic Open Hearth Steel Billets, Blooms and Slabs, by CARNEGIE STEEL COMPANY, to AMERICAN LOCOMOTIVE COMPANY, New York, N. Y.

QUANTITY: Not less than 75% of Buyers' total requirements for the year, 1905, and not to exceed Six Thousand (6,000) gross tons.

MATERIAL: Basic Open Hearth Steel Forging Billets, Blooms and Slabs, of sectional area not less than sixteen square inches, sizes and lengths within the capacity of Sellers' mills, of quality to comply with Buyers' specifications No. 9-B of June 1st, 1903.

SPECIFICATIONS: Buyers are to furnish Sellers with specifications at least twenty (20) days in advance of shipment required; also an approximate estimate of their requirements of the materials covered by this agreement for the month commencing sixty (60) days in advance. For example, on January 1st Buyers will advise the Sellers of the approximate tonnage they will require during the month of March.

TIME OF SHIPMENT: Shipment shall be made as promptly after receipt of specifications as conditions at Sellers' mills will permit, and in approximately equal monthly quantities.

PRICE: All delivered f.o.b. cars Buyers' works as enumerated below, in carload lots. If less than carload shipment, carload rate of freight only to be allowed:

For sizes 4″ up to but not including 10″ and of corresponding sectional area. Carbon up to and including .25.	For sizes 10″ square and larger, and of corresponding sectional area, carbon up to and including .25.	Delivery Point.	
$24.10	$26.10	Schenectady Works,	Schenectady, N. Y.
24.10	26.10	Cooke “	Paterson, N. J.
23.20	25.20	Brooks “	Dunkirk, N. Y.
23.90	25.90	Dickson “	Scranton, Pa.
24.50	26.50	Rhode Island “	Providence, R. I.
24.50	26.50	Manchester “	Manchester, N. H.
21.50	23.50	Pittsburg, “	Allegheny, Pa.
24.30	26.30	Richmond “	Richmond, Va.

all per gross ton.

For carbons .26 to .60 inclusive, $1.00 per gross ton extra;
For carbons over .60, $2.00 per gross ton extra.

Payment shall be made by the Buyers in cash within net thirty days from date of shipment, in New York exchange or other funds par in Pittsburg.

Remarks: It is understood and agreed between the parties hereto that inasmuch as this contract covers billets for driving axles, any tonnage of driving axles purchased by Buyers from Sellers under contract of November 15th, 1904, shall be deducted from the tonnage sold hereunder, the total amount of this contract being decreased accordingly.

It is a condition of this contract that Buyers shall not resell any of the material sold hereunder without first putting it through a process of manufacture at their works.

The Seller is hereby given the right to have any constituent company of the United States Steel Corporation furnish material of the same kind and quality at same cost to purchaser, in whole or part performance of this contract, and it is agreed that shipments and billing of material by or in the name of such constituent company, as well as any payments made to such constituent company therefor, shall be as effective and binding as if made by or to the Carnegie Steel Company direct.

Sellers shall not be held responsible for delays in deliveries caused by strikes, differences with workmen, accidents at mills, or other contingencies beyond their control.

CARNEGIE STEEL COMPANY.
Sam'l A. Benner

General Manager of Sales.
Harper

Accepted:
AMERICAN LOCOMOTIVE COMPANY:
By H. C. HEQUEMBOURG,
General Purchasing Agent.

Government Exhibit No. 421.

(March 19, 1913.)

AMERICAN BRIDGE COMPANY
of New York,
100 Broadway, New York, N. Y.

NEW YORK, December 30, 1904.

Mr. W. V. S. THORNE,
Director of Purchases,
120 Broadway, New York City.

DEAR SIR:

We hereby agree to furnish to the Union Pacific Railroad Company, Oregon Short Line Railroad Company, The Oregon Railroad & Navigation Company, Southern Pacific Company, The Chicago & Alton-Railway Company, and The Kansas City Southern Railway Company, or any of their present or furture associated or proprietary companies, such Railway Steel Structures of the kinds mentioned on Schedule A, attached, as they may require for their use, in accordance with detailed instructions for each individual order we may receive from the General Manager of the Railroad Company concerned in regard to details of construction, shipping directions, inspection, method of making out and forwarding bills, bills of lading, inspection certificates, etc., under the terms and conditions named below.

It is understood that all of this material will be furnished in accordance with the Railroad Companies' Specification C. S. 1006 for Steel Railway Structures, attached, and also in accordance with directions to be furnished by the Railroad Companies.

It is understood that so far as practicable bridges ordered will conform with the Railroad Companies' Common Standard Drawings, of which we have negative prints, where it is practicable to use such lengths and types of bridges, but that in case special designs different from these are required to meet special conditions, the Railroad Companies will furnish additional drawings to indicate what is desired.

It is understood that we shall be expected to make shipment of this material very promptly, and further that we will use our every endeavor to meet the requirements, in each specific case, of the General Managers making the applications against this agreement.

Under the terms of this agreement it is understood that the Railroad Companies will purchase from us an aggregate minimum amount of at least twelve thousand (12,000) net tons of railway steel structures, and such additional tonnage up to twenty-five thousand (25,000) net tons as they may desire to specify to us under the same terms and conditions during the calendar year 1905.

If at any time when material is ordered from the mills for the work mentioned herein the market prices for beams and channels shall be less than 1.40c. per pound, base, Pittsburg delivery, then the price to be paid to us for the work hereunder shall be correspondingly reduced; but in no event shall the price to be paid us for the work herein mentioned be in-creased (*sic*) notwithstanding the said contractor at the time of purchasing materials during the calendar year 1905 for the work herein may be required to pay a price therefore (*sic*) in excess of the present market prices of materials.

Terms of payment are to be net cash thirty days from date of invoice, and it is understood that the invoices will be paid at the local general offices of the Railroad Companies concerned.

All correspondence in connection with the general conditions of this agreement should be addressed to us at #100

Broadway, New York City. (*sic*) and all correspondence in regard to engineering features, details, etc., should be addressed to Mr. August Ziesing, Vice President, American Bridge Company of New York, 1315 Monadnock Block, Chicago, Ill.

The prices named in Schedule A are made for the material F. O. B. Cars at the points named, with the understanding that the Railroad Companies' men will erect the structures.

In case it is desired that our Company's men should erect any of these structures, as we understand we should probably be asked to do in case of some of the tonnage required for The Chicago & Alton Railway Company, and possibly in the case of some required for the Kansas City Southern Railway Company. (*sic*) we will do this work at prices to be mutually agreed upon if possible with the General managers concerned, with the understanding that the Railroad Companies will furnish, free of charge to us, the necessary transportation for our men and tools over their lines, and with the further provision that there will be no usual conditions affecting the erection.

This proposition, when accepted by you, will be considered as an agreement between our respective companies, and it is understood that you will send copies of this agreement to the General Managers of each of the Railroad Companies concerned for their information.

Yours truly,
AMERICAN BRIDGE COMPANY OF NEW YORK,
By C. W. BRYAN,
Division Contracting Manager.

ACCEPTED.
W. V. S. Thorne.
Director of Purchases.

DECEMBER 30, 1904.

Copy to
Mr. J. Kruttschnitt, Director of Maintenance & Operation, Chicago, Ill.
Mr. A. L. Mohler, G. M. U. P. R. R. Co., Omaha, Nebraska.
Mr. W. H. Bancroft, V. P. & G. M. O. S. L. R. R. Co., Salt Lake City, Utah.

A 9772, etc.
Schedule – Gen'l Agreement.

SCHEDULE "A".

TYPE OF STRUCTURE	PROBABLE APPROXIMATE REQUIREMENTS AND DISTRIBUTION IN NET TONS							PRICE PER POUND F. O. B. CARS AT		
	U. P.	C. S. L.	G. R. & N.	S. P. Atl. Sys.	S. P. Pac. Sys.	C. & A.	K'C. S.	Ambridge, Pa.	Chicago, Ill.	New Orleans, La.
I Beams	117.	122.5						2.24	$2.40	2.53
Trough Floors		18.					No Detailed Information Yet Received.	2.59	2.75	2.88
Shop Roofs					350.			2.64	2.80	2.93
Plate Girders	3345.	926.5	991.		1178.	310.7		2.24	2.40	2.53
Viaduct Towers					95.			2.59	2.75	2.88
Riveted Spans	1557.		777.5	365.	135.)			2.44	2.60	2.73
Pin Connected Spans	306.		2204.	304.	420.)	837.6		2.44	2.60	2.73
Swing Spans			315.		850.			3.64	3.80	3.93
Turntables			28.75					2.84	3.00	3.13
Totals,	5325.	1067.	4316.25	669.	3028.	1148.3				
GRAND TOTAL	15553.55									

W. V. S. Thorne

This schedule is referred to and made a part of letter dated December 30, 1904, to Mr. W. V. S. Thorne, Director of Purchases, Harriman Lines, from American Bridge Co. of New York.

Mr. E. E. Calvin, G. M. O. R. & N. Co., Portland, Ore.
Mr. W. H. Bancroft, Acting G. M. S. P. Co. (Pacific System) San Francisco.
Mr. T. Fay, V. P. & G. M. G. H. & S. A. Ry., Houston, Texas.
Mr. S. M. Felton, Pres. C. & A. Ry. Co., Chicago, Ill.
Mr. S. R. Knott, President. K. C. S. Ry. Co., Kansas City, Mo., for their information.

Government Exhibit No. 422.

(March 19, 1913.)

American Bridge Company of New York,
42 Broadway, New York, N. Y.

July 28, 1908

Mr. W. V. S. Thorne,
Director of Purchases,
120 Broadway, New York City.

Dear Sir:—

We will furnish to the Union Pacific Railroad Company, Oregon Short Line Railroad Company, the Oregon Railroad & Navigation Company, Southern Pacific Company, Northwestern Pacific Railroad Company, and the San Pedro, Los Angeles and Salt Lake Railroad Company, Southern Pacific Company Atlantic Steamship Lines and Pacific Mail Steamship Company, or any of their present or future associated or proprietary companies, such Steel Structures of the kinds mentioned on Schedule A, dated July, 1908, attached hereto, as they may desire to purchase from us for their use in accordance with the detailed instructions for each individual order we may receive from the General Manager or Local Purchasing Agent of the Railroad Company concerned, in regard to details of construction, shipping instructions, inspection, method of making out and forwarding bills, bills of lading, inspection certificates, etc., under the terms and conditions mentioned below.

Minimum Tonnage.

It is understood that the aggregate quantity of Steel Railway Structures to be purchased from us under this Agreement is to be not less than 10,000 net tons per annum, and as much more as the companies mentioned may desire to purchase from us.

Specification C. S. 1006 for Steel Railway Structures.

It is understood that all of this material will be furnished in accordance with the Railroad Companies' Specification

C. S. 1006 for Steel Railway Structures, adopted February, 1904, where such specifications are applicable.

SPECIFICATIONS AND BILL OF MATERIAL FOR STEEL WATER TANKS FOR MILD CLIMATE.

Material furnished for Steel Water Tanks will be in accordance with Specifications and Bill of Material for Steel Tub for one 65,000 gallon Steel Water Tank for Mild Climate, dated January 8, 1908, and also in accordance with Specifications and Bill of Material for Steel Supporting Tower for one 65,000 gallon Steel Water Tank for Mild Climate, dated January 8, 1908.

It is understood that we shall NOT be required to furnish the material referred to on Specifications and Bill of Material for Valves and Spout for one 65,000 gallon Steel Water Tank for Mild Climate, dated January 8, 1908, which, it is understood, the Railroad Companies expect to obtain from other manufacturers of such specialties.

SPECIFICATIONS AND BILL OF MATERIAL FOR STEEL WATER TANKS FOR COLD CLIMATE.

Material furnished for Steel Water Tanks will be in accordance with Specifications and Bill of Material for Steel Tub for one 65,000 gallon Steel Water Tank for Cold Climate, dated January 8, 1908, and also in accordance with Specifications and Bill of Material for Steel Supporting Tower for one 65,000 gallon Steel Water Tank for Cold Climate, dated January 8, 1908.

It is understood that we shall NOT be required to furnish the material referred to on Specifications and Bill of Material for Valves and Spout for one 65,000 gallon Steel Water Tank for Cold Climate, dated January 8, 1908, which, it is understood, the Railroad Companies expect to obtain direct from other manufacturers of such specialties.

COMMON STANDARD DRAWINGS.

It is understood that, so far as practicable, bridges ordered will conform with the Railroad Companies' Drawings referred to in the list of Common Standard Drawings for

Steel Railway Structures attached, dated July, 1908, where it is practicable to use such lengths and types of bridges, but that, in case special designs different from these are required, to meet special conditions, the Bridge Company will, if desired, by the Railroad Company, furnish the strain sheets and detailed working drawings required, without extra charge. Inasmuch as the use of standard spans wherever practicable is the essence of this Agreement, to get the full advantage of standards, spans should be ordered in multiples wherever it is possible to do so, and we consider it important that this feature, ordering in multiples where possible, be strictly adhered to.

The list of Common Standard Drawings referred to also shows the numbers, dates and titles of drawings illustrating Common Standard Turntables and Common Standard 65,000 gallon capacity Steel Water Tanks for Mild Climates and for Cold Climates, referred to in the Specifications mentioned above.

In case the Railroad Companies issue additional drawings from time to time to illustrate additional sizes of Common Standard or other Bridges not mentioned on the list of drawings referred to herein, but of the same general style of construction, etc., it is understood that we will be furnished with copies of same and that thereafter in case such drawings are referred to on orders placed with us for bridges we will be governed accordingly.

Address for Orders.

All orders and correspondence in connection with deliveries, etc., should be addressed to the American Bridge Company of New York, C. W. Bryan, Division Contracting Manager, 30 Church Street, New York City, as this we find will undoubtedly expedite the handling of your orders more than if they were sent to any other of our offices.

Address for Correspondence in Connection with Engineering Features, Etc.

All correspondence in connection with engineering features, plans and specifications and other technical details, etc., should be addressed to the American Bridge Company of New York, F. J. Llewellyn, Division Contracting Manager, Commercial National Bank Building, Chicago, Illinois, as it will be found more convenient for him to attend to such matters on account of his being where he can easily confer upon such matters with Mr. John D. Isaacs, Consulting Engineer of the Railroad Companies concerned, who is also located at Chicago, and time will be saved and misunderstandings avoided thereby.

PROMPT SHIPMENT OF MATERIAL.

It is understood that we agree to make shipment of all material ordered under this Agreement very promptly and further, that we will use every endeavor in each specific case to meet the requirements of the General Managers or Local Purchasing Agents, placing orders under this Agreement. It is desirable, however, that orders be placed as far in advance of time material is required as practicable to assist in enabling us to make deliveries at times and places desired.

It is understood that fires, strikes of operatives, or any other unavoidable cause beyond our control, will relieve us from prompt fulfillment of Agreement.

PRICES AND POINTS OF DELIVERY.

We will furnish Steel Railway Structures under the terms of this Agreement at the prices and points of delivery mentioned on Schedule A, dated July, 1908, attached hereto.

In case we should in future fabricate Steel Railway Structures at other points than those mentioned on Schedule A, which are more favorably located as regards point of delivery for Steel Railway Structures destined for some of the Companies referred to above, we would likewise be willing to furnish Steel Railway Structures referred to at such other point of manufacture at prices equally as low considering the cost of manufacture at such point.

It is understood that providing we are given reasonable notice in advance as to what the requirements of each of the Railroad Companies concerned are to be, we are to make deliveries of Steel Railway Structures ordered under this Agreement at such points of delivery and at prices indicated on Schedule A, as may be most favorable for the Railroad

Company concerned and as may be designated by such Railroad Company on orders.

It is understood, however, that we reserve the right to fabricate any of this material at any of our other shops to which we may prefer to assign it.

CLASSIFICATION OF MATERIAL.

It is understood that classification of Steel Railway Structures referred to in this Agreement is to be as shown on Schedule A and in order to facilitate settlement before presenting our bills, we are to apply to Mr. John D. Isaacs, Consulting Engineer, at 135 Adams Street, Chicago, Illinois, for a ruling as to classification to which any particular kind of Steel Railway Structures should be assigned, which may be ordered under this Agreement, in case there is any doubt or difference of opinion as to the class to which they should properly be assigned and that the decision of the Consulting Engineer of the Railroad Companies is to be final in such matters.

ERECTION OF STRUCTURES.

It is understood that the Railroad Companies' men will erect the Steel Railway Structures referred to.

In case it is desired that our Company's men should erect any of these structures, we will do this work at prices to be mutually agreed upon, if possible, with the General Managers or other authorized representatives of the Railroad Companies concerned, with the understanding that our prices will at all times be as low for any such work as we may make to any of our other customers under similar conditions and with the understanding that the Railroad Companies will furnish, free of charge to us, the necessary transportation for our men and tools over their lines and with the further provision that there will be no unusual conditions affecting the erection.

SCRAP ALLOWANCE FOR FULL-SIZED EYE BARS TESTED TO DESTRUCTION.

Referring to Paragraph 14 of Specification CS-1006 in regard to testing full-sized eye bars to destruction, we would

SCHEDULE "A" DATED JULY, 1908

To accompany letter dated July 28th, 1908
From American Bridge Company of New York.

Types of Structures	Price per pound f. o. b cars at				Plates	Beams	Angles
	Ambridge, Pa.	Chicago, Ill.	New Orleans, La.	Pencoyd, Penna. Trenton, N. J. Edge Moor. Del.	X	Y	Z
1. I-Beam Bridges	2.35	2.53	2.64	2.51		5	
x2. I-Beam-Beams upon which there is shop work, not included in any class	1.60 base	and card extras				5	
3. Deck plate girders	2.35	2.53	2.64	2.51	2		3
4. Through Plate "	2.45	2.63	2.74	2.61	2		3
5. Riveted Truss Spans	2.60	2.78	2.89	2.76	2	1	2
6. Through & Deck pin spans	2.65	2.83	2.94	2.81	3		2
7. Trough Floors	2.60	2.78	2.89	2.76	3		2
(8. Swing Spans and Machinery for)) ((9. Same)	3.80	3.98	4.09	3.96	3		2
10. Viaduct Towers & Steel Trestle bents NOTE: Viaduct girders and trestle girders to come under Class 3 or 4	2.65	2.83	2.94	2.81	2		3
11. Shop roofs, columns & bracing NOTE: Crane girders for shops to come under Class 3	2.65	2.83	2.94	2.81	2		3
12. Columns, girders & riveted work for office buildings	2.60	2.78	2.89	2.76	2	1	2
13. Turntables	3.15	3.33	3.44	3.31	2		3
14. Cylinder Piers and bracing	2.55	2.73	2.84	2.71	4		1
15. Water Tank Tubs	2.55	2.73	2.84	2.71	4		1
16. Water Tank Towers	2.65	2.83	2.94	2.81	1	3	1
17. Signal Bridges & supports for same	3.25	3.43	3.54	3.41			5
#18. Unclassified- NOTE: Prices for this are to be made to correspond with the above classifications for regular bridge work.	At prices correspondingly low considering cost.						

say that for the scrap resulting from such tests in connection with bridges which we are to furnish under this agreement, we will make an allowance to the Railroad Companies concerned of $10.00 per net ton, which is the best we can realize after working this scrap up for the mills and paying transportation to the mills.

We, therefore, believe this allowance to be an equitable one and it is as much as we are allowing to any of our other cusotmers under similar circumstances.

We find that eye bars are the only parts of bridges tested to destruction.

TERM OF AGREEMENT.

This proposition, when accepted by you, shall be considered an Agreement between the Railroad and Steamship Companies mentioned herein and ourselves, to remain in force for a period of one year and thereafter until six months' notice from us to the authorized representative of the Railroad Companies to the contrary, or until six months' notice from the authorized representative of the Railroad Companies to us to the contrary.

Yours truly,
C. W. BRYAN,
DIVISION CONTRACTING MANAGER.

SCHEDULE "A" DATED JULY, 1908, (CONTINUED.)

x With regard to Class "2", in which we price fabricated "I" beams at $1.60 plus usual card extras, we enclose herewith Carnegie Steel Company's printed sheet dated January 1st, 1902, giving these extras as adopted throughout the country.

# In order to facilitate settlements before presenting our bills, we are to apply to Mr. J. D. Isaacs, Consulting Engineer, at 135 Adams Street, Chicago, for a ruling as to classification to which any particular kind of Steel Railway Structures should be assigned, which may be ordered under this Agreement, in case there is any doubt or difference of opinion as to the class to which they should properly be assigned and that Mr. Isaac's decision is to be final in such matters.

The prices named above for steel railway structures are based on an average price of tank plates, beams and angles, f. o. b. Pittsburgh, Pa., of $1.60 per hundred pounds, as quoted in the "Iron Age" of July 11th, 1908, page 191, and are the prices at which we would be willing to furnish steel railway structures referred to on orders placed with us previous to September 30th, 1908.

As regards orders placed with us during any subsequent three months' period of any calendar year, during the term of this Agreement after September 30th, 1908, the prices of steel railway structures ordered from us are to be in accordance with the following:

X For each advance or decline of every full 5c per hundred pounds in the average price of *tank plates* at Pittsburgh, Pa., above or below a price of $1.60 per hundred pounds, as quoted in the "Iron Age" during the months of March, June, September and December, in any calendar year during the term of this Agreement, the price to be charged by us on orders placed with us under this Agreement, during any subsequent quarter of the calendar year during the term of this Agreement, is to advance or decline from the figures originally quoted in this Agreement for each particular class of material designated, an amount in cents per hundred pounds, equal to the figures shown in the column above headed "X" opposite each particular class of structure.

Y For each advance or decline of every full 5c per hundred pounds in the average price of beams 3″ to 15″, at Pittsburgh, Pa., above or below a price of $1.60 per hundred pounds, as quoted in the "Iron Age" during the months of March, June, September and December, in any calendar year, during the term of this Agreement, the price to be charged by us on orders placed with us under this Agreement, during any subsequent quarter of the calendar year, during the term of this Agreement, is to advance or decline from the figures originally quoted in this Agreement for each particular class of material designated, an amount in cents per hundred pounds equal to the figures shown in the column above headed "Y" opposite each particular class of structure.

Z For each advance or decline of every full 5c per hundred pounds in the average price of *angles* 3″ to 6″, ¼″ and up, at Pittsburgh, Pa., above or below a price of $1.60 per hundred pounds, as quoted in the "Iron Age" during the months of March, June, September and December. in any calendar year during the term of this Agreement, the price to be charged by us on orders placed with us under this Agreement, during any subsequent quarter of the calendar year, during the term of this Agreement, is to advance or decline from the figures originally quoted in this Agreement for each particular class of material designated, an amount in cents per hundred pounds equal to the figures shown in the column headed "Z" opposite each particular class of structure.

Subject: New Agreement for furnishing Steel Railway Structures.

Union Pacific Railroad Company
Oregon Short Line Railroad Company
The Oregon Railroad & Navigation Company
Southern Pacific Company

Please refer to File 1-136

Office of Director of Purchases,
120 Broadway,
New York City.

New York, July 30, 1908.

American Bridge Company of New York,
c/o Mr. C. W. Bryan, Division Con. Manager,
30 Church Street, New York, N. Y.

Dear Sirs:

Your proposition dated July 28th, 1908 in regard to furnishing to the Union Pacific Railroad Company, Oregon Short Line Railroad Company, The Oregon Railroad & Navigation Company, Southern Pacific Company, Northwestern Pacific Railroad Company, San Pedro, Los Angeles & Salt Lake Railroad Company, Southern Pacific Company's Atlantic Steamship Lines, and the Pacific Mail Steamship Company, or any of their present or future associated or proprietary companies, such Steel Structures of the kinds mentioned as they may desire to purchase from your Company, is received, and the terms you mention are satisfactory and accepted, and I will send copies of this correspondence to each of the officials concerned of the railroad and steamship companies mentioned for their information and files.

Yours truly,
(Sgd.) W. V. S. Thorne.

T-Br.

1-136

New York, July 31st, 1908.

American Bridge Company of New York,
c/o Mr. C. W. Bryan, Division Contracting Manager,
30 Church Street, New York N. Y.

Dear Sirs:

Referring to my telephone conversation with you this morning, I have inserted in your letter to me of July 28th, 1908, immediately following the paragraph headed "Prices and Points of Delivery", and immediately preceding the paragraph headed "Classification of Material", the following clause which was omitted through an oversight, and which reads the same as in last year's agreement;

"Terms of Payment"

"Terms of payment are to be net cash in thirty (30)" "days from date of invoice, and it is understood that the" "invoices will be paid at the local general office of the Rail-" "road or Steamship concerned."

Will you kindly see that the U. S. Steel Products Export Company is furnished with this information.

Yours truly,
W. V. S. Thorne.

T/K